The SOUTHERN
ECONOMIC JOURNAL

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Communications, Reviews, Periodicals, and Notes

ASPECTS OF THE ECONOMICS OF POPULATION GROWTH—PART II*

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V

Dynamic forces may at times counterbalance the tendency of the substitutability of population for resources to decline as population increases. But these forces are subject to limitations of two sorts: (a) those which, being institutional and/or habitual in character, are somewhat susceptible of being removed; (b) those which, arising out of the finitude of the components of a circumscribed universe, or out of the comparative constancy of some of the elements which shape social organization and patterns of individual behavior, are not removable.

Were it not for these limitations, it would be possible in very large measure to offset the output-depressing influences of population growth by a combination of (i) modification of consumption patterns, (ii) diminution of the input of productive agents per unit of output, and (iii) augmentation of the supply of utilizable resources. But man's capacity to make these changes is limited. Hence the augmentability of population in a given area, and at a given level of living, is quite restricted.

(i) A modification of consumption patterns produces an increase in real income if from a given quantity of labor and resources a larger quantity of real income is obtained than before these patterns were modified.[64] This increase results because (a) labor input is reduced and/or (b) less scarce productive agents are substituted for more scarce productive agents. In the present instance, where our concern is principally with the economizing of scarce resources through their replacement by labor which is plentiful, it is (b) that is most important— (b) in the form of the substitution of less resource absorbing goods and services for those which are more resource absorbing. The factors which limit the modifiability of consumption patterns are physiological, psychological, and social in character. For illustrative purposes we turn to food consumption which is especially subject to these limitations.

Within limits man may utilize either *primary* or *derived* food units to supply

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* Part I of this essay appeared in the October 1947 number of this journal.

[64] A consumption pattern is modified when, because of a change in tastes (i.e., in indifference maps) with other determinants of demand remaining the same, the demand function for a given category of goods (or services) shifts. See note 73.

his needs: he may use *primary* or *derived* calories to meet his energy require-
ments, and *primary* or *derived* units to satisfy his other food wants.[65] If, like
Nebuchadnezzar, man lived upon primary calories alone, he would require to
satisfy his food needs only about one-seventh as much land and resources as if
he lived upon derived calories alone.[66] But for agronomic and physiological
reasons man cannot live upon primary calories alone. (a) The maintenance
(to say nothing of the increase) of soil fertility and crop yields and the prevention
of erosion make necessary the devotion of a considerable amount of agricultural
land to the production of animal food.[67] (b) When a nation derives too small a
fraction of its calorie consumption from animal products, vitamin and other
nutrient deficiencies develop. In practice this fraction (which probably needs
to be at least 20 per cent)[68] must be large enough to provide both absolute re-

[65] A *primary* food unit is one drawn from foodstuffs raised immediately upon land (e.g.,
vegetables, fruits) or in water (plant organisms); a *derived* food unit is one drawn from food-
stuffs, raised only mediately upon land or in water, that is, from foodstuffs (e.g., fish, meat,
dairy products) into which *primary* food units have been converted. The terms *primary*
or *original* have usually been applied only to calories (see John Lindberg, *Social Research*,
XII, 1945, pp. 181–204; Food and Agricultural Organization of the United Nations, *World
Food Survey*, Washington, 1946, pp. 19 ff.). The nomenclature suggested above is preferable
on grounds of generality. On the conversion ratio between primary and animal-food cal-
ories, by type, see R. D. Jennings, *Feed Consumption by Livestock 1940–41*, USDA Circular
No. 670, 1943, esp. p. 44. On the land, labor, and other resource costs of calories and nu-
trients, by food type, see R. P. Christenson's (mimeographed, USDA) *Using Resources to
Meet Food Needs* (1943). On nutrient costs see G. J. Stigler, *Journal of Farm Economics*,
XXVII, 1945, pp. 303–14.

[66] Lindberg (*op. cit.*, p. 185) estimates that a completely animal-food diet of 3,000
(derived) calories represents an original input of 21,000 *primary* calories. The ratio of
derived to primary calories varies with the composition of the animal-product diet under
consideration; it may be less than or more than 1:7 (*World Food Survey*, p. 19, n.). See also
A. J. Lotka on food chains in *Elements of Physical Biology*, chap. 14.

[67] E. g., see Lindberg, *op. cit.*, pp. 185–86, 196–200. In Europe agricultural output per
acre is generally higher where the production of animal products is important than where
this is not the case.

[68] H. R. Tolley states: "When a nation derives 80 or 90 per cent of its calorie
requirements from cereals and potatoes, there is a strong presumption that mineral and
vitamin deficiencies are widespread. On the other hand, when 35–50 per cent of all calories
come from animal products, such deficiencies are not likely to be widespread among all
groups and classes." See Tolley's essay in T. W. Schultz, *Food for the World*, p. 164. M. K.
Bennett states: "One can probably say conservatively that national diets composed more
than 70 per cent of cereal-potato calories are very likely to be qualitatively inadequate, in
some degree or other damaging to the human organism." Yet five-sevenths of the world's
population live on such diets. See "International Contrasts in Food Consumption," *Geo-
graphical Review*, XXXI, 1941, pp. 372, 375. A "restricted emergency" diet prepared by H.
K. Stiebling and M. M. Ward stipulates (on the assumption that one-third of the fats are of
animal and fish origin) that 25 per cent of the calories be of animal and fish origin and 48 per
cent of cereal-potato origin. Corresponding percentages for an "adequate diet at minimum
cost" are 37 and 38. See *Diets at Four Levels of Nutritive Content and Cost*, USDA Circular
No. 296, 1933, pp. 3, 28, 37. While it is sometimes said that about one-half "of the protein in
a diet should be of animal origin" (see *Final Report of the Mixed Committee of the League of
Nations on the Relation of Nutrition to Health, Agriculture and Economic Policy*, p. 60), H. C.
Sherman states "that the old habit of specifying some fixed proportion of animal protein in

quirements and a margin of safety against carelessness in food consumption. For the ordinary consumer is less skilled than the expert nutritionist in drawing energy, vitamins, and mineral requirements from foodstuffs.[69]

A 2,800 calorie intake per day, of which 25–35 per cent are of animal origin, represents 7,000–8,680 primary calories; a 2,400 daily intake under the same conditions, 6,000–7,440 primary calories.[70] These primary calorie requirements must be increased by 20–30 per cent to allow for seed, waste, loss, and feed for animals (e.g., draft) not used primarily as food sources.[71]

Consumers, if left free to choose, are not likely to substitute primary for derived calories, even when such substitution is physiologically feasible. Consumption vectors do not point in this direction. The importance of derived calories in dietaries is positively associated with the level of per capita income and the evidence suggests that income elasticity of demand is greater for derived than for primary calories.[72] When, upon the advent of adverse economic circumstances, consumers substitute primary for derived calories, they do this because their incomes have fallen and/or the price of primary calories has declined relatively to that of derived calories. If these changes were also accompanied by an appropirate modification of tastes, primary would be substituted for derived calories in greater measure. But habit and social practice stand in the way of such modification. Presumably it could be brought about through the use of force and propaganda.[73]

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setting a protein standard for dietaries or food supplies is now superfluous" (see USDA Miscellaneous Publication No. 546, *Principles of Nutrition and Nutritive Value of Food*, p. 12).

[69] E.g., in Japan, where only 10–15 per cent of the calories available for consumption come from livestock products (see Tolley, *op. cit.*, p. 165), malnutrition originated in the dietetic habits of the people as well as in the absolute restrictedness of the food supply (see E. F. Penrose, *Population Theories and Their Application*, pp. 125 ff.). Even in the United States where more than 35 per cent of the calories available originated in livestock products in the 1930's the average American dietary was short of calcium and riboflavin and, at times, of other nutrients (Sherman, *op. cit.*, pp. 21, 36–38). See Section VII below.

[70] The Food and Nutrition Board of the National Research Council in 1943 recommended 2,730 calories for the then American population. Recommended allowances for adult males ranged from 2,500 for the sedentary to 4,500 for the very active; for adult females, from 2,100 for the sedentary to 3,000 for the very active. See *ibid.*, pp. 6–7, 36; National Research Council Circular 122, *Recommended Dietary Allowances*, 1945, p. 10.

[71] Although Richter's figures suggest a 23 per cent allowance, a "some 30 percent" figure is indicated (Lindberg, *op. cit.*, p. 188).

[72] E.g., see R. G. D. Allen and A. L. Bowley, *Family Expenditure*, pp. 45–47; H. Staehle, *Quarterly Journal of Economics*, LIV, 1940, pp. 217–31; N. L. Gold and M. Enslow, *ibid.*, LVII, 1943, pp. 596–629. Also C. E. V. Leser, *Review of Economic Studies*, IX, 1941, pp. 40–58.

[73] The initial effect of such involuntary modification would be the descent of affected persons to a lower plane of satisfaction. If in time, however, they became adjusted and developed a greater liking for what they were "induced" to consume, they might find themselves able to satisfy both their former and additional wants, and their incomes would be higher. Note the apparent effect of the food stamp plan (J. D. Coppock, *American Economic Review*, XXXV, 1945, pp. 99 ff.), or the alacrity with which the female, though protesting against the ukases of the overlords of fashion, adjusts the length and grip of her skirt to their unwelcome obsolescence-accelerating dictates.

The food supplies accessible abroad to food-importing nations are limited for two reasons. The domestic requirements of food-exporting countries rise as their living standards improve. Opulent nations are not disposed to modify their tastes in order that more calories may be made available to food-importing nations.

While the limits to the modifiability of tastes for nonfood products are socio-psychological rather than physiological in character, these limits are not easily raised. When population growth depresses per capita income and the relative price of labor, resource-absorbing products are replaced in part by labor-absorbing products. But this income-increasing substitution is effected *within* the existing framework of tastes, which continues essentially unchanged. Moreover, it does not appear that autonomous changes in tastes are much more likely to be labor-favoring than resource-favoring, even when population pressure prevails. Force and propaganda can, in some degree, substitute labor-favoring for resource-favoring tastes.

Limitations upon the modifiability of consumer tastes curb the consumption-modifying power of international trade. (a) If a populous country which is short of capital tries to ease this shortage by borrowing abroad, it must closely supervise the use of the borrowed foreign exchange; otherwise some of the borrowed funds will be exchanged for goods which do not add to or free domestic productive power.[74] (b) If a populous country is dependent upon foreign sources for some of its foodstuffs and raw materials, exchanging labor-absorbing goods therefor, its ability to import these commodities is conditioned, *ceteris paribus*, by foreign consumption patterns over which, as a rule, it can exercise little dominion.[75]

Consumers are more free, in theory, to augment their real incomes by changing their tastes when their incomes are high than when they are low. Accordingly,

[74] Since a large fraction (say one-half) of a nation's capital equipment consists of immovable assets, a nation's power of adding to its capital stock by borrowing abroad is limited; it can import for this purpose only movable assets and consumables which release domestic productive power for the purpose of making immovable assets. See N. S. Buchanan, *International Investment and Domestic Welfare*, pp. 17–19, 110–16. In prewar England the marginal propensity to import was 15 per cent, and part of these imports were consumables. See W. H. Beveridge, *Full Employment in a Free Society*, p. 358.

[75] In the past 150 years most international trade has been carried on by countries the economic condition of whose population improved greatly despite marked population growth. Available studies do not deal directly with the effect of population growth upon the nature, direction, and terms of trade. Although the growth in industrial countries of export balances in manufactures has been more than offset by the growth of import balances of primary products, the relative extent to which manufactures are exchanged for food and raw materials has not changed, international trade in food continues less important than that in manufactures or in raw materials, and the terms of trade are more favorable to industrial countries in this than in the 19th century. See F. Hilgerdt, *Industrialization and Foreign Trade*, p. 100; A. O. Hirschman, *Quarterly Journal of Economics*, LVII, 1943, pp. 574–75, 590; C. Clark, *Conditions of Economic Progress*, chap. 14, also p. 249; E. Staley, *World Economic Development*, chap. 8. Britain's present trade problem illustrates the dangers to which a nation greatly dependent upon trade because of past population growth is exposed in an industrializing world (G. D. A. Macdougall, *Economic Journal*, LVII, 1947, pp. 78–83).

since relatively high incomes are associated with relatively high resource: population ratios, consumers are free to change their tastes when they are under little demographic compulsion to do so.[76] For when incomes are high, the attainable substitution possibilities open to consumers are greater in number and in degree than when incomes are low.[77] Thus, a high-income consumer can substitute primary for derived calories in a variety of ways whereas a low-income consumer has left few if any opportunities to substitute primary for derived calories. Consequently, even though a combination of force and propaganda were employed in a low-income country to augment real income by compelling a change in tastes, the potential effect of this combination would be limited.[78]

(ii) Diminution of the input of productive agents per unit of output serves both to release the economized agents for other purposes and to extend the period during which nonreproducible and depletable resources continue to be available. The factors making for diminution of input are subject to several forms of constraint, however. (a) The introduction of a factor-saving industrial process may be accompanied by direct and indirect changes which bring other limitations into play. For example, the development of iron-ore-saving steels has acceler-

[76] "For unto everyone that hath shall be given, . . .; but from him that hath not . . . shall be taken away," Matthew, XXV, 29.

[77] We are not here concerned with the question: is the price elasticity of demand greater at high than at low income levels? E.g., see N. L. Gold et al., op. cit., pp. 599 ff. This question relates to movements along demand functions, not to shifts of demand functions. The answer that it evokes is conditioned by the manner in which "commodity" is defined, for the degree of elasticity is positively associated with the specificity and restrictedness of the "commodity."

[78] As per worker remuneration rises relatively to the price of the use of resources, the substitution effect conduces to a relatively greater increase in the utilization of resource-absorbing than of labor-absorbing goods and services. If this effect is not more than counterbalanced by consequences attendant upon an increase in per capita income, the utilization of resource-absorbing goods will expand relatively to that of labor-absorbing goods in countries marked by a favorable resource:population ratio and a rising per capita income. On similar grounds it may be argued that a decrease in per capita income originating in increased population pressure would produce an opposite effect.

Available statistics do not fully illuminate the preceding argument. At first, as per capita income rises, the relative number of persons employed in secondary occupations (mining, building, manufacturing) increases while that in primary occupations (agriculture, forestry, fishing) falls; but eventually, with per capita income continuing to increase, the relative number in tertiary occupations (commerce, transport, services) rises. (See Clark, Conditions, chap. 5, and The Economics of 1960, chap. 3; M. K. Bennett, Quarterly Journal of Economics, LI, 1937, pp. 317–336; F. Hilgerdt, op. cit., pp. 26–27.) Whether this underlying consumption trend makes for increased equipment per worker is not clear. A study of Gastonia, N. C., suggests, however, that average investment per worker is higher in trade and service ($6,902) and the professions ($4,984) than in manufacturing ($4,289); it is highest in transportation and public utilities. If these averages are representative, and if allowance is made for the relatively greater amount of investment embodied in professional than in nonprofessional persons, the effects described are being realized. On investment per job see the U. S. Chamber of Commerce study, Investment per Job, 1945; also C. A. Bliss, The Structure of Manufacturing Production, pp. 106, 109–10; S. Fabricant, Employment in Manufacturing, 1899–1939, p. 257; National Resources Committee, The Structure of the American Economy, Part I, pp. 63, 374–77.

ated the exhaustion of nickel and chrome reserves; and the introduction of time-saving jet engines has stepped up the use of scarce cobalt and columbium. More generally, because of the interconnectedness of events, the effectuation of a saving in the use of any resource f_1 produces changes in the use rates of one or more of the other resources $f_2, f_3, \cdots f_n$, some of which, if they are relatively restricted in supply,[79] now become limitational elements.

(b) Even though the introduction of a factor-saving process does not bring other limitational elements into being, such a process cannot prevent the ultimate exhaustion of the economized resources, or defer indefinitely the advent of a time when the direct and the indirect cost of supplying the economized resources begins to rise.   For the activity of the *world*[80] economy is subject to what may be called the law of increasing economic entropy: economic activity consists of (what are in practical effect) irreversible processes which in the aggregate dissipate the *potential* utility embodied in the stock of resources, actual and potential,[81] existent in the world.   A particular part of the world may draw upon the resources of another part, a salvage rate (e.g., of copper) may be stepped up, and so on.   But use imposes its tax upon the utility embodied in the resources utilized, and economic entropy increases in the world as a whole, for a portion of this utility is dissipated and becomes economically irrecoverable.[82]

(iii) Augmentation of the supply of utilizable[83] resources may add to present and/or future productive power.   This process of augmentation, so important in the past century, is restricted directly by the fixity of the supply of that which is potentially transformable into utilizable resources, and indirectly by the rela-

[79] This principle is somewhat analogous to the Sprengel-Liebig "law of the minimum" which relates the productivity of a field directly to that necessary constituent of the soil which is present in the smallest relative amount.

[80] It is assumed that the *world* economy, as distinguished from any particular *state* economy, is essentially an isolated system.

[81] Since what is a resource depends upon (a) man's wants and (b) the technological knowledge which governs his capacity to utilize the things about him, the stock of *actual* resources may be added to through changes in tastes and accretions to technological knowledge.   The principle of increasing entropy stated above rests upon the postulate, therefore, that in the course of time actualization of potential resources does not counterbalance the resource-destroying transformation of the supply of actual resources theretofore in existence.

[82] Cf. Lotka's treatment of energy transformation and irreversibility, *op. cit.*, especially chaps. 2-3, 24-25.   Underlying what we have called economic entropy is the second law of thermodynamics, according to which the entropy of the universe tends toward a maximum whose attainment entails the "death" of the universe.   If, however, we substitute a statistical approach for that of pure thermodynamics, states Frank, we may assume that in time a less frequent state such as that of the present will again occur.   See Philipp Frank, *Foundations of Physics*, International Encyclopedia of Unified Science, Vol. I, No. 7, pp. 19–27. Such a recurrence, of course, is too removed to be of any significance for the present discussion.

[83] Until a resource is utilized, augmentation of its supply cannot increase present income even though it may increase future income.   For example, if in the existing state of technology a worker can utilize q resources, the addition of Δq to his equipment cannot increase his present productivity even though it may insure that at some future date his equipment does not fall below q.   (Psychological factors supposedly are constant.)

tive limitedness of the supplies of resources complementary to the resource whose supply is augmented.[84] The newly added resources are subject also to what we have called the principle of increasing economic entropy.

It is sometimes implied that technological progress, which is principally responsible for both diminution in resource input and increase in utilizable resource supply, may continue to offset both population growth and the production of income-depressing effects by what we have called increasing economic entropy. For it is assumed that technological progress is at an accelerating rate.[85] To this assumption exception must be taken in respect to the possibilities of technological progress suited to reduce the relative scarcity of resources. The nonaugmentability of the stock of resources, actual and potential, imposes a constraint which becomes greater as this stock diminishes. Moreover, the application of an invention may be limited by the lack of factors essential to its implementation and embodiment, or by man's inability to make and apply necessary complementary inventions. Finally, since the capacity of any specific kind of invention to accomplish a purpose is limited, accomplishment of this purpose in higher and higher measure calls for more and more powerful kinds of appropriate inventions, and these will not be continually forthcoming if restraints are imposed by the finiteness and/or the nature of the physical world, or by the direction taken by cultural progress.[86]

In this section we have indicated the nature of the circumstances which limit the capacity of dynamic forces to counterbalance the tendency of the substitutability of population for resources to decline as population increases. In Section VI the optimum is considered; in VII–VIII data which in some measure confirm our theoretical arguments are presented.

[84] See note 79 and text above.

[85] Professor Hart, whose studies in the field of cultural growth have been notably careful and informing, suggests as an hypothesis: "Throughout the entire sweep of history and prehistory, the power of human beings to achieve their basic purposes has been increasing at accelerating speed, with local and temporary stagnations and setbacks. This long-run acceleration has taken place through series of logistic and Gompertz surges, having higher and higher rates of increase." See Hornell Hart, *American Sociological Review*, XI, 1946, p. 281; also *American Journal of Sociology*, L, pp. 349–50, where it is suggested that the conformity of social trends to logistic curves may imply a rational rather than a merely empirical principle. See also Hart, *ibid.*, LII, 1946, pp. 112–22.

[86] To illustrate. Suppose the steam locomotive is newly invented, and that it is possible through the gradual perfection of this invention to achieve a maximum speed k. This achievement is possible because the distinctive element in the new invention may be combined with other elements. Let p represent the proportion of possibilities achieved and q the proportion yet to be achieved, subject to the restriction that $p + q = 1$. Let us assume that the "number of pregnant contacts at any given time," and, therefore, the increment of speed added by the improvement of the locomotive through these contacts, are proportional to pq, the magnitude of the increment rising to a maximum at $p = q = \frac{1}{2}$ and thereafter declining in the same manner as it had increased. If we plot the values of the increments proportional to pq we get the first derivative of a logistic curve. If we cumulate (integrate) the increments we get a logistic curve whose upper limit is k. If man would exceed speed k he must make a new kind of invention, the automobile, which, when perfected, will permit a maximum speed m. If man would exceed speed m he must develop a yet different invention,

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When a population situated in a given territory endowed with given resources is *just* large enough, under the circumstances[87] stipulated, to permit the maximization of over-all per capita output (= income), that population is of optimum size. This optimum is called the per capita ouput (or income) optimum. It is a function of (a) the quantity and quality of the resource equipment of the territory under consideration, and (b) the conditions governing the division of labor, the economies of scale, and the rates at which producing units can be operated. If (a) is not a constraining force, the magnitude of the optimum is governed by (b). If, on the contrary, (a) exercises constraint before the income-generating forces included under (b) have been maximized, the optimum will be of such magnitude that the marginal income-restricting force of (a) just balances the marginal income-augmenting force of (b).

There are other population optima than the income optimum. For any value index that varies with population density may be maximized. It is probable, however, that maximum values for many indices of well-being—e.g., expectation of life at some stipulated age, state of health, per capita welfare—will be associated with maximum or near maximum values for per capita income. For example, "if countries are considered as units, there is almost a logistic relationship between per capita income and mortality," mortality responding only slightly to income changes in countries with very low or with very high incomes.

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the airplane, capable, upon being perfected, of speed n. This man has done. He has made analogous improvements in the range of projectiles and in the destructiveness of explosives. (His discovery of ways of transmuting elements—until recently he could only rearrange elements in chemical combinations—gives him control over phenomena formerly beyond his control and thus lays the groundwork for many particular paths of invention.) See Hart, *American Sociological Review*, XI, pp. 282, 285, 289.

Our thesis is this. If man would exceed the maximum level of accomplishment realizable within the framework of any given invention (the summation of the increments in the capacity of which generates something like a logistic curve), he must develop a new kind of invention. Moreover, since in many fields of activity current performance is close to the maximum realizable within the present inventive framework, the need of new kinds of inventions is actual and not merely potential. Only in some fields does there remain much room for improvement within the present framework. For example, attained locomotive speed is near the attainable maximum k, while airplane speed, though farther removed from its maximum n, probably soon will approximate it. Accordingly, if speed n is to be exceeded, a new type of invention is called for. It does not follow, however, that, because man's inventiveness has enabled him to achieve higher and higher maxima in certain fields such as speed, it will continue to do this in these fields, or that his accomplishments will be correspondingly great in other fields. In many fields, it is to be presumed, he will encounter insurmountable limitational elements; in some fields he appears to have encountered them already. Whence one may not infer universal technological acceleration from particular time-bound instances of such acceleration.

[87] Let these conditions be (i) to (viii) as formulated in Section II, it being understood also that condition (viii) implies the optimum distribution of economic activities in the given territory. If one or more of these conditions is modified, the magnitude of the optimum population may be increased or decreased. For an excellent discussion of the theory of the optimum see M. Gottlieb, *Journal of Political Economy*, LIII, 1945, pp. 289-316.

In like manner expectation of life at birth, while positively correlated with per capita income, becomes relatively insensitive to income changes in countries with very high or very low incomes.[88]   Empirical analysis will probably demonstrate that between per capita income and other indices of welfare which have upper and lower limits, an essentially logistic relationship exists.   If this kind of relationship obtains, something like maximum values for other indices will be found in a region or state whose population is of income optimum size.[89]

The per capita income optimum is not easy to determine with precision, nor is it highly stable.   It is not easy to determine precisely because the necessary data are lacking.   Even so, it probably can be determined for most countries with a relatively small margin of error.   The optimum is not highly stable because its determinants in the realms of consumption and production tend to change when the economy is dynamic.   But it is not probable that these dynamic changes greatly increase or decrease the magnitude of the income optimum.

A per capita ouput optimum population is not the same thing as a military optimum population.   The former, since territory and other conditions are given, is a function of numbers; the latter is a function of both numbers and territory, particularly in an atomic age when territorial depth and industrial scatter are important.   An income optimum may, however, be reconciled with a military optimum.   Let the income optimum of a population situated in territory t be n.   Let the military optimum require at least $10t$ of territory and $12n$ of population.   Then, if the two optima may be assumed to be essentially independent of each other, the military optimum consistent with the economic optimum is $12n$ of population on $12t$ of territory, each of the quality of the original t.[90]   Other noneconomic optima may be reconciled in like manner with the income optimum.

While a fairly satisfactory income optimum may be achieved by a relatively small population on a relatively small territory, it is doubtful if, under present conditions, a military optimum can be achieved in a territory much smaller than

[88] See *Population Index*, XIII, 1947, p. 103.

[89] Let a be the actual population, o be the income optimum, and m the attainable maximum value for some composite and overriding index of per capita "welfare" which the population, given its current scheme of values, desires to maximize.   Then if, even though $a \lessgtr o$, m is realized, the population will gain nothing at present by making $a = o$.   Only if m depends in part upon resources and the population desires to have m persist into the future, is there a case for making a as small as is consistent with the realization of m.   If a logistic or Gompertz or similar kind of relationship obtains between per capita income and the value index which the community is bent upon maximizing, the income optimum may no longer coinicde with the magnitude of population making for the maximization of this value index.   Under these conditions, therefore, the income optimum should be replaced by an optimum expressed in terms of the preferred value index.

[90] The above argument suggests that the military optimum is independent of the income optimum.   This is not true.   Military strength depends, *ceteris paribus*, upon the fraction of a nation's population available for military service and the production of the sinews of war.   The higher output per worker, the higher will this fraction be.   It is possible, therefore, for the more productive of two populations of the same size and age-sex composition, to provide twice as many persons for military and related activity as the other can.

that of the United States. If this be true, most modern states can achieve something like military security short of membership in an efficient world state only by organizing integrated regional blocs with adequate bases.[91]

Per capita ouput is at a maximum when a population is of optimum size because then the forces making for the augmentation of per capita output are at a maximum for the postulated conditions (see Figure 2 in Part I). Therefore, as population increases from a suboptimum to an optimum number, *ceteris paribus*, per capita output rises.[92] Per capita output increases under these conditions because of a combination of circumstances: (a) smaller and less efficient producing units give place to larger and more efficient producing units in some or all fields of economic activity; (b) a better interunit fit is made possible; and (c),

TABLE IV

SPECIFIC PRODUCT	PLANT OPTIMUM (000)	RELATIVE DEMAND	RELATIVE NUMBERS OF PLANTS NEEDED (C × 1/B)	OPTIMUM NEED			PLANTS[a] REQUIRED	
				Plants	Product (000)	Workers[a] (000)		
A	B	C	D	E	F	G	H[b]	I[c]
1	1	1	1	27,720	27,720	2,772	12	72
2	2	1	½	13,860	27,720	2,772	6	36
3	3	1	⅓	9,240	27,720	2,772	4	24
4	5	1	⅕	5,544	27,720	2,772	2⅖	14⅖
5	7	1	⅐	3,960	27,720	2,772	1⅗	10⅖
6	8	1	⅛	3,465	27,720	2,772	1½	9
7	9	1	⅑	3,080	27,720	2,772	1⅓	8
8	10	1	1/10	2,772	27,720	2,772	1⅕	7⅕
9	11	1	1/11	2,520	27,720	2,772	1 1/11	6 6/11
10	12	1	1/12	2,310	27,720	2,772	1	6
Total . . .	—	—	—	74,471	277,200	27,720	—	—

   [a] Output per worker = 10.
   [b] Column H based upon assumption there are 12,000 workers.
   [c] Column I based upon assumption there are 72,000 workers.

effects (a) and (b) are not wholly offset by adverse changes consequent upon increases in the rates at which resources are used.

Columns A-G in Table IV are designed to illustrate what has just been said. It is supposed that 10 distinct products numbered 1–10 (col. A) are being produced in an economy;[93] that each of these products is being consumed at the

   [91] Hart's studies suggest that the respective areas dominated by national (or quasi-national) states are bound to grow and the number of states to decline. The above argument, if valid, is consistent with Hart's projection. See Hornell Hart, *Can World Government be Predicted by Mathematics?*, pp. 12 ff.

   [92] In Figure 2 in Part I of this essay it is assumed that per capita output rises smoothly and continuously. In reality, however, under the conditions assumed and under any at all probable conditions, the upward movement will be jerky rather than smooth because improvement in interfirm coordination and fit will be jerky.

   [93] By product is meant any commodity or service supplied by private or by public enterprise and into the composition of which labor and/or resources enter. Consumer goods are not distinguished from producer goods since productive agents, being mobile, will be used as demands dictate.

same rate (col. C); that, in the existing state of the arts and division of labor, the optimum rate of output for a plant of optimum size in each of the 10 industries is that reported in column B.[94]   Under these circumstances there will be required for each optimum plant producing product 1, one-half an optimum plant producing product 2, and so on as reported in column D.   Accordingly, if a perfect interplant fit is to be achieved—that is, if in each of the 10 lines of production only plants of optimum size operating at optimum capacity are to be used—the number of plants required will be as reported in column E.[95]   Whence, if it be assumed that output per worker in each line of production is 10, and that workers constitute 0.4 of the population, the optimum number of workers will be 27,720,000, while the optimum number of population will be 69,300,000, subject to the postulate that effects under (c) do not render the optimum smaller.[96]

Further consideration of Table IV leads to a number of conclusions, given *ceteris paribus*.   First, the smaller the plant optimum in terms of output and/or workers, the smaller will be the optimum population.[97]   If we assume for each product a plant optimum of 1,000 instead of the optima reported in column B, worker and population optima become, respectively, 1,000 and 2,500.   If we assume an output per worker[98] of 100 instead of 10, the worker optimum (col. G, last line) becomes 2,772,000.   Second, the smaller the deviation of the relative demand for specific commodities from the average demand for all commodities, the smaller, as a rule, will be the worker and population optima.[99]   Third, the

[94] A plant is of optimum size when its operation at optimum scale permits the realization of the lowest attainable cost per unit of output.   For convenience output per worker under optimum conditions of plant operation is assumed to be 10 in each of the 10 industries.   If a smaller and less efficient size of plant were employed, cost per unit would be higher and output per worker would be lower.

For the sake of simplicity it is assumed that the plant optima reported in column B are plant optima in terms of the economy as a whole; that whatever elements enter into the determination of optima thus conceived have been taken into account; and that, if plant optima are in any wise interdependent, this interdependence has been allowed for.   On some of the factors which determine optimum size for producing and/or distributing units, see E. A. G. Robinson, *The Structure of Competitive Industry*, chaps. 2–5, 7, 9; also my note, *Southern Economic Journal*, VII, 1941, pp. 399 ff.

[95] The L. C. D. of the denominators of the fractions in column D is 27,720.

[96] In the absence of adverse effects under (c), a multiple of 69.3 millions would also be an optimum.   The larger the optimum, however, the higher is the rate of increase in economic entropy (see Section V).

[97] This statement holds, of course, whether there be only one plant optimum (say 1,000 units of output), or several (say 1, 7, and 10 thousands) that give the same results.

[98] This statement implicitly assumes that the plant optimum is independent of the output per worker.   This assumption may or may not be valid.   Production within a plant is a complex process involving a greater or a lesser number of stages.   An increase in the output per worker in any given stage is equivalent to an increase in the over-all output of finished product per worker in the plant; yet an increase in the output per worker in some stage may (e.g., by raising the L.C.M. of the outputs by stage) increase rather than decrease the size of the optimum plant in terms of both aggregate output and number of workers.

[99] E.g., if the relative demands reported in column C are not always 1 but 1, 2, 4, 1½, 8, 6, 14, 18, 4, 10, the worker and population optima become 94.71 and 236.775 millions, respectively.

smaller the dispersion of plant optima about the average of all plant optima (cols. B and D), the smaller commonly will the population optimum be.[100] Fourth, the fewer the kinds of commodities wanted, the smaller will be the worker and population optima.[101]

If the actual population increases beyond 69.3 millions, per capita output will fall slightly because of the worsening of the inter-production-unit fit. It will also fall if output per worker in some of the extractive industries begins either to diminish, or to diminish in greater measure, because of increased pressure at the intensive and/or extensive margins. Worsening of the fit is a less important source of decline than increased pressure in the extractive industries.

The method of arriving at an optimum already described tends to underemphasize the role of diminishing returns in the extractive industries and to overlook the fact that a much smaller approximate optimum exists. Let us turn to columns A–C and H–I in Table IV. Given 12,000 workers and the conditions of columns A–C, the number of plants required in each of the 10 industries is that reported in column H. The resulting condition of plant utilization in industries 4–8 is unsatisfactory and not easily remedied. If the number of workers is increased to 72,000, with the other conditions unchanged, the number of plants required in each industry is that reported in column I. In but four industries (4–5, 8–9) is demand not a multiple of the plant optimum. In three of these (4–5, 8) the demand can be met by operating each plant 1/35 beyond optimum capacity; in industry 9 each plant must be operated 1/11 beyond capacity. If plant marginal cost curves are highly elastic in each industry, and if the demand for each of the 10 products is highly elastic, output per worker will continue to approximate 10. For, given elastic cost curves, output per worker falls little when optimum capacity is exceeded; while, given elastic demand curves, some of the estimated supra-capacity demand in industries 4–5 and 8–9 will shift to industries 1–3, 6–7, and 10 where the cost curve remains relatively lower and probably more elastic.

Our second method of arriving at an optimum population has given us nearly as good a result in terms of inter-production-unit fit for a worker population of 72,000 as we got for one of 27,720,000. The more elastic the cost and demand curves in the industries composing the economy, the less will be the advantage of the larger population.[102] In no realistic case which allows for economic fluctuation and dynamic change can the advantage of the larger over the smaller population be appreciable on grounds of fit. Accordingly, since present and future

[100] This will not be true under all conditions; e.g., if the relative value for each of products 2–10 in column C is the reciprocal of the corresponding value in column B.

[101] The L.C.D. of the denominators of the fractions in column D will tend to be smaller; the total number of plants (col. E, last line) will be smaller. If only product 1 were required, the population optimum would be 250, and per capita consumption would be 4. Under the conditions of production and consumption of Table IV, per capita consumption of each of the 10 products is 0.4; of all 10 together, 4.

[102] The conditions which we noted above as making for a smaller optimum population are equally applicable in the present case.

pressure upon resources in the extractive industries is bound to be much less with the smaller than with the larger population, it is the smaller rather than the larger which constitutes the true long-run income optimum population.

While the augmentation of international trade serves (within limits) to increase per capita output, it may or may not alter a country's income optimum. (i) It will increase or decrease the optimum accordingly as it increases or decreases the magnitude of the population required for a perfect inter-production-unit fit. (ii) It may increase or decrease the optimum, in the future if not in the present, accordingly as it eases or intensifies the pressure of population upon resources, and particularly as it decelerates or accelerates the rate of increase in economic entropy.

The augmentation of a country's international trade may, if it gives rise to population growth and an increase in the dependence of that country upon foreign sources for foodstuffs and raw materials, increase the potential insecurity of that country's resource base. For, as industrialization progresses and income rises in the countries of provenance, their demands for their own raw materials and (in greater measure) foodstuffs (or food-producing resources)[103] will expand, and their export "surpluses" will shrink.[104] This shrinkage will probably be felt more keenly in the food[105] than in the raw material categories.[106]

Our analysis suggests that income optima are smaller than is usually supposed.[107] If this analysis and our argument regarding the military optimum be valid, it follows that military strength should be sought through blocs, bases, and alliances rather than through populationist policies which can contribute little for 15 or more years.

[103] In 1937 the percentages of world production, by type, consumed outside the country of production were: foodstuffs, 16.6; raw materials and semifinished goods, 56.8; manufactured goods, 11.7; all products, 19.2. Computed from Clark, *Conditions*, p. 457.

[104] In 1937 industrial countries absorbed about three-fifths of the imports of foodstuffs and raw materials and finished goods, with most of the two former classes coming from nonindustrial countries. See League of Nations, *The Network of World Trade*, pp. 17–18, 22–24.

[105] Of the continents only Europe, which has imported one-fourth of its food consumption (dry basis), will be adversely affected; only 6 per cent of world food consumption enters intercontinental trade (F. A. Pearson and F. A. Harper, *The World's Hunger*, pp. 9–11).

[106] A small number of countries account for most of the exports and the imports of specific commodities. See *Network*, pp. 7, 30–36; Hilgerdt, *op. cit.*, pp. 56, 100.

[107] Professor John Jewkes, having observed that if Britain's population were smaller, her least efficient firms could be closed, declared: "It is difficult to think of any one important industry or public service which could not seize upon the full economies of large scale production with (say) a market of 20 million persons in an area as small as that of Great Britain. On the other side the cost of congestion in our main centres of population in the way of traffic delay and time spent in reaching and returning from work must be considerable" (*Manchester School of Economic and Social Studies*, X, 1939, p. 110). Since economies of scale, after they have been developed by larger firms, may be introduced by smaller firms (Rothbarth, *op. cit.*, pp. 389–90), a population that has diminished in size will retain many of the economies of scale which emerged originally because the population was larger.

VII

Because the circumstances governing industrialization and production are complex,[108] our short account of the augmentability of resources and of the substitutability of labor for resources in (a) agriculture and (b) nonagriculture is incomplete.[109]

(a) Evidence of various sorts suggests how the substitutability of labor for agricultural resources declines as the population:resources ratio rises. (i) Clark presents data for 20 countries and 9 divisions of American states. Let y = output per male worker in agriculture; x = density expressed as the number of male workers per 1,000 hectares (= 2,471 acres) of farm land. Then $y = \dfrac{A}{x^n}$ where $n = \frac{1}{2}$, and A is a constant with a value (in this case) of about 4,200 I.U.[110] "Production per head tends to vary inversely with the square of the density." The marginal product of labor is $\dfrac{A}{2x^n}$; that of a unit (1,000 hectares) of land is $\dfrac{Ax^n}{2}$. The elasticity of technical substitution, σ, of labor for land is one, the substitutability of labor for land falling at the same rate as that at which labor (x) increases.

Clark's formula is not wholly adequate. First, the value of σ is not as the formula implies, independent of the magnitude of x. σ cannot remain equal to one; it must fall and eventually descend to zero. The formula implies that not until $x = 17,640,000$, and there are 7,139 male workers per acre, does the marginal product of labor fall to 0.5 I.U. Yet, long before this, the marginal product would have fallen to zero, and earlier still it would not have sufficed for the support of a worker.[111] Second, the formula does not take into account interna-

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[108] See Rothbarth (op cit., pp. 383–90) and L. Rostas (Economic Journal, LIII, 1943, pp. 39 ff., and Royal Economic Society Memorandum 107, 1946).

[109] In this section the relationship of agriculture to nonagriculture is largely disregarded. Yet income per capita, by country or region, is positively correlated with the smallness of the per cent of all workers engaged in agriculture (for 35 countries the Spearman rank coefficient of correlation is +0.878 with a probable error of ±.027). This relationship has its origin in part in two circumstances. First, since output per worker usually is lower in agriculture than in industry (Clark, Conditions, p. 342), over-all average income is low in proportion as the relative number of agricultural workers is high. Second, output per worker in agriculture is higher, as a rule, and output per acre tends to be somewhat higher, in industrial than in nonindustrial countries. The rank coefficient (based on 22 countries for which Clark gives data) of correlation between smallness of per cent of workers in agriculture and output per agricultural woker is +0.714 (P.E. = ±.074), and between smallness of this percentage and output per hectare is +0.193 (P.E. = ±.095). See also Hilgerdt, op. cit., p. 38.

[110] I.U. are International Units of Value. Rank correlation between x and y for 24 countries is +0.756 ± .062 (data from Clark, Conditions, p. 244; Economics, pp. 34–39).

[111] In China, J. L. Buck's data suggest, the marginal product of labor becomes zero when the input of labor per acre exceeds 0.25 man (Land Utilization in China, chap. 9, Tables 9–12, 16). In densely peopled lands where labor is cheap it tends to be used unproductively (e.g., see ibid.; H. G. Moulton, Japan, pp. 398–99; Lau Shaw's novel, Rickshaw Boy). In proportion as an economy is mobile, factor movement is free, and distribution is on a mar-

tional differences in raw data, in quality of land and climate and workers, and in type of equipment and methods used.[112]   For this reason actual average product frequently exceeds theoretically expected product in advanced countries, and falls below it in backward countries.

(ii) W. E. Moore overcame some of these shortcomings by converting land into terms of relatively homogeneous "arable equivalents," and output into terms of relatively homogeneous "crop units."[113]   Even so, because many international differences persist, output per worker is not highly correlated, by country, with land per worker, nor is output per hectare highly correlated with number of workers per hectare.[114]

The countries of Europe fall roughly into three groups, with the members of each group lying about a distinct regression line.   Let y = average output per person dependent upon agriculture, and x = number of persons dependent upon agriculture per square kilometer of "arable-equivalent" agricultural land.   For the high output-per-worker group (1), which includes seven countries (Denmark, England and Wales, Scotland, Netherlands, Belgium, Germany, and Switzerland), $y = 152.8 - 0.65476x$.   For the nine-country (France, Sweden, Austria, Luxemburg, Norway, North Ireland, Latvia, Czechoslovakia, and Ireland) intermediate group (2), $y = 79.1 - 0.3977x$.   For the low output-per-worker group (3), which includes 13 countries (Estonia, Spain, Hungary, Lithuania, Italy, Finland, Portugal, Roumania, Greece, Poland, Bulgaria, Yugoslavia, and Albania), $y = 42.03 - 0.2102x$.[115]

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ginal productivity basis, the population of an occupational area tends to become stationary when the worker's marginal product in such area approximates his direct and indirect reproduction cost.   See note 147 below.

[112] On the effects of climate see E. Huntington, *Principles of Economic Geography*, and *Annals* of the American Academy of Political and Social Science, CLXLVIII, 1938, pp. 77 ff.   If modern systematic agriculture were introduced throughout Europe, present regional differences in yields would be reduced but not eliminated (E. Dániel, *Review of Economic Studies*, XII, 1944-45, pp. 31-49).

[113] *Economic Demography of Eastern and Southern Europe*, esp. pp. 35, 197 ff.   On W. Staniewicz's method of reducing heterogeneous land to units of plowland see C. L. Stewart, *Land Policy Review*, VII, 1944, pp. 15 ff., and *Illinois Farm Economics*, No. 127 ff., 1945-46, pp. 313 ff.

[114] If all conditions other than the number of workers per hectare were constant, we should expect: (a) a high positive correlation between output per worker and land per worker; (b) a high negative correlation between output per hectare and land per worker; and (c) a high negative correlation between output per worker and output per hectare. The expected relationships are not found, however, because sometimes a relative shortage of land is offset in part by superior methods of cultivation, and because in general conditions other than the worker: land ratio vary from country to country.   For 29 European countries for which Moore gives data the Spearman rank coefficient of correlation for the three indicated relationships are: (a) $+.498 \pm .098$; (b) $-.057 \pm .131$; and (c) $+.806 \pm .106$.   These correlations are determined for persons dependent upon agriculture.   The same finding obtains for males engaged in agriculture, since the rank correlation between yield per male engaged in agriculture and yield per person dependent on agriculture is $+.978 \pm .006$.

[115] The standard error of estimate σy_s, together with the number of countries within ± 1 σy_s, is 17.67 and 5 for group (1).   The corresponding figures for group (2) are 5.08 and 5; for (3), 4.6 and 10.   The sigma representing the standard of error of estimate should not be

The marginal values corresponding to these average y-values are: (1) $y_m = 152.8 - 1.30952x$; (2) $y_m = 79.1 - 0.7954x$; and (3) $y_m = 42.03 - 0.4204x$. The elasticity of technical substitution σ is below one-half for all positive values of x, diminishing as x increases; at $x = 50$ it approximates one-third in all three cases.[116] The marginal product, therefore, must descend to zero, in case (1) when x approximates 117, and in cases (2) and (3) when x approximates 100.

The data suggest that, given agricultural conditions such as prevailed in pre-war Europe, the marginal product of agricultural workers approximates zero when the number of persons dependent upon agriculture rises above 100–120 per square kilometer (247 acres). In view of the fewness of observations and of other data limitations, this finding is merely approximate. Nonetheless, it suggests that the substitutability of labor for land is limited and diminishing, and that marginal product must eventually fall to zero if the worker:land ratio is continually increased.[117]

(iii) From American data presented by J. D. Black one may draw a conclusion similar to that derived from Moore's European data. Black reports, largely as of 1929 for nine geographic divisions and a number of individual states, net farm income and equipment (i.e., land [by type] in farms, together with the value of land, farm buildings, and capital goods) per agricultural worker. Account may therefore be taken of variations in the quality of the land and in the amounts of capital used jointly with land, or as a substitute for it.[118] Let $y = $ net income per

confused with the sigma representing the elasticity of technical substitution. Of the total variance in y (= average output), the fraction attributable to variation in x (= worker :land ratio) is about one-half in case (1) and about three-quarters in cases (2) and (3). The number of cases in each group is very small.

[116] When the average value $y = a - bx$, $\sigma = (a - 2bx)/2(a - bx)$. That is, $\sigma = $ the marginal product divided by two times the average product. See Section I of Part I.

[117] In but four of the 29 countries was the number of persons dependent upon agriculture at or above 100: Switzerland, 107.1; Ireland, 102.5; Yugoslavia, 100.1; Albania, 176.4. The ability of densely populated countries in Western Europe to escape this pressure, together with their high per worker yields, is attributable in part to their ability to import foodstuffs and feed. E.g., English wheat yields per acre have risen with the reduction in wheat acreage (Clark, *Conditions*, pp. 256–57).

About 35–45 per cent of the population dependent upon agriculture in Eastern and Southeastern Europe, Moore estimates (*op. cit.*, pp. 61–75), is unneeded in agriculture and adds little to aggregate output. See note 119 below.

[118] Capital goods other than farm buildings are complements to farm land rather than substitutes for it. For the nine divisions the rank correlation of the per worker value of farm land with the per worker value of capital goods and farm buildings, respectively, is $+.8 \pm .085$ and $+.27 \pm .22$. (In parts of Europe, Moore reports [*op. cit.*, pp. 89 ff.], small land holdings sometimes are overequipped with certain forms of capital.)

Although both the quality of land per worker and the associated amount of equipment are highly correlated with the amount of land per farm worker, each independently influences output per farm worker. Output per farm worker is (rank) correlated (in the nine divisions and the country as a whole) with these variables as follows: with land in farms per worker, $+.85 \pm .06$; with value of farm land per worker, $+.95 \pm .02$; with all agricultural property per farm worker, $+.985 \pm .007$. Black's averages on which this analysis is based are given in *Annals* of the American Academy of Political and Social Science, CLXXXVIII, 1936, pp. 205–17; *Review of Economic Statistics*, XVIII, 1936, pp. 66–83.

agricultural worker and x = the number of agricultural workers per \$10,000 of agricultural property. For the nine divisions and the country as a whole $y = 1{,}409 - 1.991x$; $\sigma y_s = 169$, and five of ten units lie within $\pm 1\,\sigma y_s$. When the three western divisions are excluded, $y = 1142 - 1.33x$, with $\sigma y_s = 65$, and five of seven units lying within $\pm 1\sigma y_s$; the amount of variance explainable in terms of variation in x (worker:property ratio) rises from about seven-tenths to above eight-tenths. The corresponding marginal values are $y_m = 1{,}409 - 3.982x$ and $y_m = 1{,}142 - 2.66x$.

As in (ii) the elasticity of technical substitution σ is under one-half for all positive values of x, declining as x increases. The marginal productivity of agricultural workers must eventually descend to zero. The data suggest that when agricultural property per worker falls in the neighborhood of \$26–\$29 hundred, the product of workers at the margin is at or close to the zero level.[119] Our findings are essentially suggestive in character, since our observations are few in number.

(iv) Analysis of McCormick's findings relating to farm population pressure in Wisconsin suggest that the marginal product of a unit of farm population descends in the neighborhood of zero when the number of acres per unit of farm population falls near to or below 20 acres.[120] McCormick divided Wisconsin into three somewhat homogeneous agricultural areas (I, II, and III)[121] and then estimated what would be the farm population required in a given area[122] and what would be its gross farm income (= gross output) if the land:man ratio in each of the counties in this area were raised to the level prevailing in those counties where

[119] In 1929 agricultural property per worker was at or near the \$26–29 hundred level only in the three southern divisions of states. It was below this level only in the east south central states where it averaged \$1,920 in contrast with a national average of \$6,320 and a divisional maximum of \$11,120 in the west north central states.

The census returns for 1930 tend to support the above reasoning. If in 1929 the farms grossing under \$1,000 had been withdrawn from cultivation, aggregate agricultural production would have been reduced only about 15 per cent. In that year 21.3 and 41.2 per cent, respectively, of the nation's non-part-time farms grossed under \$600 and \$1,000. The corresponding percentages for the south Atlantic and the east and west south central states were 29.7 and 55; 35.1 and 63.3; 29.1 and 53.6. In these three divisions were located 71 per cent of the national under-\$600 farms, 75 per cent of the under-\$1,000 farms, and about 71 per cent of the excess farm population. See notes 117, 122.

[120] This analysis is based principally upon T. C. McCormick's Tables II, IV, and VI in the *Journal of the American Statistical Association*, XXXVIII, 1943, pp. 165–177.

[121] G. Tintner's analysis of agricultural production functions indicates that the effect of an increase in the relative amount of land is conditioned by the type of product. In Iowa he found a 1 per cent increase in land was accompanied by an increase of 0.586 per cent in crops but of only 0.276 and 0.278 per cent, respectively, in beef feeders and hogs. Elasticity of output with respect to labor is greatest in dairying and hog production; with respect to both improvements and liquid assets, in the production of beef; and with respect to working assets and cash operating expense, in dairying. See *Econometrica*, XII, 1944, pp. 28–30, 33–34; cf. Clark, *Conditions*, pp. 270–71.

[122] In 1930, McCormick concludes, "excess" farm population approximated 204,000, or 24 per cent of the total farm population. At that time the farm population living on non-part-time farms grossing under \$1,000 approximated 142,000.

per capita income was at or near the maximum. The basic facts are given in columns 2–8 of Table V. I_2 represents the aggregate gross income by area, given the actual farm population P_2; the corresponding average income is given in column 7. I_1 represents the estimated aggregate gross income by area, on the assumption that the farm population has been reduced from P_2 to P_1; the corresponding average income is given in column 6. In column 8 is given the estimated marginal income per unit of farm population centered at $(P_1 + P_2)/2$. In the last column is given the marginal income per unit of farm population at $(P_1 + P_2)/2$, based upon the assumption that the marginal income curve for a given area corresponds to a linear average income curve which passes through the average income values associated in this area with populations P_1 and P_2.[123] Since the hypothetical marginal value reported in the last column corresponds very closely by region with what may be called the "observed" marginal value reported in the penultimate column, it may be inferred that the hypothetical marginal income curve describes the actual situation reasonably well and that the elasticity of technical substitution σ is below one-half and falling as farm

TABLE V

AREA	INCOME IN $ (000,000)		FARM POPULATION (000)		AVERAGE INCOME		MARGINAL INCOME	
	I_1	I_2	P_1	P_2	At P_1	At P_2	$\dfrac{I_2 - I_1}{P_2 - P_1}$	Hypothetical at $(P_2 + P_1)/2$
I	76.69	77.27	270.1	314.1	$284	$246	$13.08	$13.00
II	59.59	68.07	245.6	341.3	243	199	88.35	87.00
III	23.51	28.70	139.0	203.8	169	138	72.12	72.00

Source: Derived from McCormick, *op. cit.*

population increases. If this inference is valid, it may also be inferred that marginal gross income (= gross output) will move in the neighborhood of zero when the number of acres per unit of farm population becomes somewhat less than 24 in area I, 25 in area II, and 21 in area III.[124]

The data presented indicate that since the elasticity of substitution of labor for resources is limited and subject to decline, the marginal productivity of agricul-

[123] See columns 6–7. The equations for average income (= y), by region, are: I, $y = 517 - 0.86363x$; II, $y = 355 - 0.45833x$; III, $y = 235 - 0.477x$. The corresponding marginal values for y, by region, are: $517 - 1.72726x$; $355 - 0.91666x$; $235 - 0.954x$.

[124] McCormick gives several optimum ratios for each area: I, 27 and 32; II, 34 and 40; III, 31 and 45. He finds the variation in per capita income to depend much more upon variation in the man:land ratio than upon that in the value of farm land. With the value of the land and the type of farming held constant, the variance "in per capita income from county to county that may be attributed to differences in the land-man ratio and associated factors" is 0.63 in area I, 0.68 in area II, and 0.49 in area III. See *op. cit.*, 166, 170–71. Since in 1930 about one-third of the farm population was reported as gainfully employed in agriculture, the averages given above may be converted into terms of gainfully employed agriculturalists by multiplying by 3.04. In Europe the productivity of peasant farms is at an optimum in the size-range 37.5–75 acres (Clark, *Conditions*, p. 271).

tural labor must fall to zero unless this declensional tendency is arrested by technological improvements.

Since labor and other productive agents are not continually substitutable for cultivatable land, the population capacity of the earth is limited by: (1) the number of acres suitable (in view of their topographic, rainfall, and other limitational qualities) for food production; (2) the fraction of these acres that can be devoted to food production; (3) the quantity of primary calories consumed per capita; and (4) the output of primary calories per acre.

Of the world land area (35.7 billion acres) only about 2.6 billion, or 7 per cent, are adapted to agricultural production.[125]   Six-tenths of the adaptable acres are devoted to food crops (including grain for livestock), the balance being used to grow hay, cotton, etc., or to lie fallow; by continent this fraction ranges from 0.38 in South America to 0.79 in Asia (see cols. 2–3 in Table VI).   If this fraction were raised to 85–90 per cent, the number of acres available for food crops would approximate 2.2–2.3 billion acres;[126] but even so, the population of Asia, comprising about 53 per cent of the world total, cannot be equipped with as much as one-half crop acre per capita, while 25 years hence, the world average will probably be under 0.8.

In the prewar period per capita calorie consumption in the world approximated 2,500 with about one-half the population consuming under 2,250, two-thirds under 2,750, and one-third over 2,750.   Since per capita production *in terms of primary* calories, which ranged from 10,000 or more in some parts (North America, Oceana, and a few additional countries) to 2,750 and less (in parts of Asia, Africa, and Latin America), averaged perhaps 4,200 in the world as a whole, per capita consumption *in terms of primary* calories was below 4,000.[127]   This

[125] See information-packed *The World's Hunger* (by Pearson and Harper), p. 50.   Huntington (*op. cit.*, pp. 28–30) reports 2.24 billion acres under cultivation.   E. Raisz (*Atlas of Global Geography*, p. 50) and J. F. Timmons (*Land Policy Review*, VII, 1944, p. 9) estimate the world's cultivatable acreage at four billion.   Soilless culture is not a significant substitute for land culture (USDA *Yearbook of Agriculture*, 1943–47, pp. 289–92).

[126] In Europe, Oceana, and North America inedible farm products constituted (in value) 12 and 10 per cent, respectively, of recorded and of all (recorded plus unrecorded) farm products in 1925–34 (computed from Clark, *Conditions*, p. 249).   In the United States about 85 per cent of net farm output "is destined for human food, most of which is consumed domestically" (H. Barger and H. Landsberg, *American Agriculture 1899–1939*, pp. 293, 27); about 88.5 per cent of the labor power (as of 1940) needed in agriculture was devoted (on the assumption that export allowances balance import requirements) to the production of food (O. V. Wells, *Land Policy Review*, III, 1940, p. 4); about 10 per cent of the crop acres are used in nonfood production.   Individual countries, of course, may import inedibles.   Thus industrial Great Britain and Japan, which used inedible farm products equal in value to one-fifth of their food consumption, imported 91 and 29 per cent of these inedibles; for nonindustrial Poland, the corresponding percentages were 4 and 13 (computed from Clark, *Conditions*, p. 249).

[127] On nonfood calorie consumption see note 71 above.   Given a daily per capita intake of 3,000 calories, per capita daily and annual consumption *in terms of primary calories*, when 5 per cent of the 3,000 consists of animal foodstuffs, is (in thousands) 3.9 and 1,424; when 10 per cent, 4.8 and 1,752; when 15, 5.7 and 2,081; when 20, 6.6 and 2,409; when 30, 8.4 and 3,066; when 40, 10.2 and 3.725.   The calorie averages given in the text are taken or estimated

average is much below what may be considered a minimal safety diet of 3,000 calories, one-fifth of which are of animal origin, which entails the production of 6,600 primary calories. For although per capita consumption of foodstuffs on a dry basis does not vary markedly with interregional differences in income, per capita consumption of grain (directly and in the form of animal foods) and animal food is positively correlated with income (see cols. 7–10, Table VI; also Table VII). Accordingly, the smaller the fraction of total calorie intake consisting of animal foodstuffs, the larger the number of people a given area can support; thus with this fraction at one-tenth instead of at two-fifths, 112.5 per cent more people can be supported. Given the per capita grain consumption reported for Asia in Table VI (col. 8), world grain supplies could maintain some 2,831 millions

TABLE VI

| CONTINENT | ACRES (MILLION) | | ACRES PER CAPITA | | FOOD CROP YIELD PER HARVESTED ACRE (LBS.)[c] | CONSUMPTION PER CAPITAL | | ANIMAL FOOD ÷ ALL FOOD[e] | |
	Agriculture[a]	Food[b]	Agriculture[a]	Food[b]		All Food[c]	Grain[d]	Produced	Consumed
Asia	600	476	0.52	0.41	1046	543	592	2	3
Europe	890	477	1.55	0.83	976	587	788	10	17
N. America	570	317	3.10	1.72	1058	567	1859	7	25
Africa	240	152	1.53	0.97	643	545	605	3	4
S. America	220	83	2.47	0.93	1066	552	966	9	16
Oceana	60	24	5.45	2.18	740	572	1545	14	36
World	2580	1529	1.19	0.70	1003	558	772	6	9

Source: Taken or computed from Pearson and Harper, *op. cit.*, pp. 50, 20, 51, 12, 68, 7, 13.

[a] Acres adapted to agricultural production.

[b] Acres in food crops, including grain fed to livestock but excluding hay, fallow, cotton, etc.

[c] Weight on dry basis with water excluded.

[d] Weight on wet basis with water included.

[e] Animal food produced as per cent of all food produced and animal food consumed as per cent of all food consumed, both on dry basis.

of people; the corresponding figures, given European and North American standards, respectively, are 2,127 and 902.[128]

Although the per acre yield of foodstuffs on a dry weight basis does not differ so much from continent to continent (Table VI, col. 6), the per acre yield on a value basis does, ranging from about 3.4 I.U. in Argentine to 60.8 in Holland.[129]

from the FAO, *World Food Survey;* M. K. Bennett, "Wheat in National Diets," *Wheat Studies*, XVIII, 1941–42 and *loc. cit.*, *Geographical Review*, XXXI, 1941, pp. 365–76; H. R. Tolley, *loc. cit.;* and V. D. Wickizer and M. K. Bennett, *The Rice Economy of Monsoon Asia.* Data for individual countries are given in Table VII below.

[128] Pearson and Harper, *op. cit.*, pp. 68–69.

[129] Computed from Clark, *Conditions*, chap. 7, p. 246. Diets in densely populated Japan, India, and China approximate 23, 22, and 16 I.U. whereas 60 is optimum (*ibid.*, pp. 249–51; *Economics*, pp. 42–43).

It varies widely also in primary calories, ranging from about 2.74 millions per acre in West Europe to about 0.95 millions in North America.   Per acre yield of primary calories varies widely by crop: e.g. (in the United States, by thousands): Irish potatoes, 2,283; white rice, 2.134; corn (grits), 2,030; wheat, 1,132; fresh asparagus, 178.[130]   In prewar Germany wheat and potatoes yielded 2.76 and 4.48 million calories, respectively, per acre; in Holland the wheat yield may have been a third higher, and the potato yield at least a sixth higher than in Germany. In prewar Japan the primary calorie yield of an acre of rice was about 4.7 million.[131]

Unless agricultural yields per acre are greatly increased throughout most of the world, there will not be sufficient agricultural production to improve food consumption and meet the needs of a growing population.   With present and prospective American yields, probably 1–1.5 acres (exclusive of grazing land) will be needed to supply a combination moderate and liberal cost diet.[132]   At this level of consumption, given that 90 per cent of the adaptable acres are used to raise food, the world can support only about 1.6–2.3 billion inhabitants.   Given that per capita consumption be raised to the equivalent of 6,600 primary calories (i.e., a 20 per cent meat diet) in Europe, Asia, and Africa; that present consumption be continued elsewhere; and that all calories produced are consumed: then the output of primary calories must be increased about three-fifths, to 5,600 trillion.   At calorie yields per acre typical of prewar Eastern Asia (which was reasonably representative of world yields), about 2.8 billion acres are needed.   At West European calorie yields per acre (which corresponded to prewar German wheat yields in calories), 2,043 million acres are needed; at Netherlands wheat yields, only about 1.5 billion acres are needed.   Since these estimates make no allowance for the 20–30 per cent leakage of output into seed, draft-animal feed, etc., they must be increased accordingly.   If this is done, a 20 per cent meat diet can be supplied only if average world per acre yields are raised close to the Netherlands level.   By 1970, however, the world's population will have risen

[130] See R. P. Christensen, *op. cit.*, pp. 38–40, 50–51.

[131] On European yields see A. Dániel, *op. cit.*, pp. 50, 60.   The figure for Japan is estimated from Wickizer and Bennett, *op. cit.*, p. 319.   The Japanese prewar rice yield was nearly 3–5 times that in non-Japanese parts of Asia.   Cereals and potatoes "tend generally to be the cheapest" sources of calories.   Wheat, or wheat in combination with another grain, is the principal source of calories for some 700 millions of people; rice, for some 950 millions, in areas where rice is the cheapest food.   See *ibid.*, pp. 108, 126 n.; Bennett, "Wheat etc.," *loc. cit.*, pp. 53, 57, 63.

[132] To provide four types of diets the following numbers of acres "exclusive of grazing land" were required on the basis of 1917–26 yields: emergency, 1.2; adequate minimum cost, 1.5; adequate moderate cost, 1.8; adequate liberal cost, 2.1 (Stiebling, *op. cit.*, p. 5).   In recent years yield per acre has been about three-tenths above the 1917–26 level (J. F. Dewhurst and associates, *America's Needs and Resources*, pp. 609, 614); therefore the required acres may be reduced correspondingly.   They may be reduced even more if per acre yield rises to higher levels.   According to Dewhurst (*ibid.*, p. 604), however, 2.4–2.6 acres per capita are needed to provide a moderate of higher cost diet at present and (presumably) to meet our export requirements.   To provide Clark's optimum diet (*Conditions*, pp. 246, 251) about one acre would suffice in Holland and Belgium; 1.85 in Germany; about 2.5 in France.

about one-third above the 1946 level, and by the year 2,000, nearly one-half.   It is evident, therefore, that only if there is a miraculous increase in output per acre can the present and the prospective population be provided with at least a minimal safety diet.   It is much more likely that the present situation in which five-sevenths of the world's population gets 70 or more per cent of its calorie intake from cereals and potatoes will persist.[133]

(b) The data readily available which bear upon the relationship between output and resources per worker in nonagriculture are less satisfactory than are analogous agricultural data.   Notwithstanding, these data clearly indicate that the substitutability of labor for resources is limited and diminishing.

(i) Per capita output (= income) is closely associated with the amount of energy used per worker.   In the United States the total output of energy used in performing work has increased at about the same rate as the national income, "the average amount of energy used per dollar of national income" rising only "from 2.7 horsepower-hours in 1860 to 2.8 in 1940.[134]   In the early 1920's, Douglas found the Spearman rank coefficient of correlation between kilowatt hours per capita and the average real wage in the United States, Canada, and seven European countries was $+.58$ with a standard error of $\pm.149$.[135]   Let y = income and x = energy used per breadwinner.   For 28 countries for which data are available the Spearman rank coefficient of correlation is $+0.78$ with a probable error of $\pm.052$.[136]   The coefficient is no higher for a number of reasons, among them that employment varied, that not all energy (e.g., from work animals, photosynthesis) is included, that the efficiency with which energy is used varies, and that energy, though physically homogeneous, is economically heterogeneous, being employed in varying proportions in the more and in the less economically significant uses.[137]   Even so it is evident that per capita output rises with per capita energy used, and that man can increase the latter only by drawing more energy from nonhuman sources.   In the United States in 1929 of the energy derived from coal, petroleum, water, and human workers, only 2.4 per cent came

[133] It is estimated that the agricultural output of India can be increased 50 per cent (FAO, *World Food Survey*, p. 20).   The per capita supply of calories at retail before 1939 was about 2,021, of which not more than 200 were of animal origin.   These 2,021 calories, therefore, were equivalent to about 3,200 primary calories, of which not over 3,000 were actually consumed directly or indirectly.   Hence elevating per capita consumption to the 6,600 primary calories represented by a 20 per cent animal food diet calls for an increase, in terms of primary calories, of 3,600, or 120 per cent.   Evidently a 50 per cent increase in India's agricultural output could at most make possible a 10 per cent animal food diet; and this possibility would be reduced by population growth which is at the rate of about one per cent, or four million, per year.   In most other parts of Asia, and in parts of Africa and Latin America, similar situations are found.   For a like opinion see G. C. L. Bertram, *Geographical Journal*, CVII, 1946, pp. 196–99.

[134] Dewhurst, *op. cit.*, p. 784.

[135] *The Theory of Wages*, p. 109.

[136] The energy rates, as of 1929, are computed from T. T. Read, *American Economic Review*, XXXV, 1945, p. 144, and Colin Clark's data for 1925–34.   Inspection of a scatter diagram indicates that the data do not lie closely about a single regression line, and that a fair fit appears to lie in the neighborhood of $y = 160 + 50x$.

[137] E.g., see E. W. Zimmerman, *American Economic Review*, XXIV, 1934, pp. 239–49.

from human workers. The corresponding percentages for certain low-income countries were: China, 73.8; India, 70.2; Yugoslavia, 39.7; Japan, 19.1.[138]

(ii) Per capita output is positively associated with equipment per worker. The rank coefficient of correlation between the per capita value of manufacturing production and the per capita value of machinery in 15 European countries about 1925 is $0.91 \pm .031$.[139] An increase of 100 units in national income, E. H. Stern found, called (in the present century) for an increase of about 330 units in the national capital employed in the United Kingdom and the United States, and for about 200 in South Africa.[140] Clark found a parabolic relationship between $y =$ income and $x =$ capital per occupied person: $\log y = 2.884 - 1.108 \log x + 0.323$ $(\log x)^2$.[141] This curve is based upon the income-capital relationships reported for a number of countries in 1865–1939 and for nine divisions of American states. The relationship, therefore, probably is what it is in part because of the uneven distribution of influences other than that of the capital:worker ratio.[142] Among the countries to which the parabola was fitted are the United States, Japan, Australia, Argentine, and 10 European countries, for which capital and real income per worker are given as of 1913.[143] Let $y =$ real income and $x =$ capital per worker; then $y = 853.3 - 0.858x$, with $\sigma y_e = 212.7$, and about one-half of the variance in y attributable to variation in x. While the corresponding computed marginal value (i.e., $y_m = 853.3 - 1.716x$) becomes zero when capital per worker falls in the neighborhood of \$1,000, actual income per worker in Japan, where capital per worker averaged only \$460, was \$128.[144] Evidently the elasticity of technical substitution of labor for capital σ declines with the continuing increase in the worker:capital ratio, and worker marginal product approaches zero when the capital equipment per worker becomes very low.

(iii) Since the elasticity of substitution of labor for capital other than land

[138] Computed from Read, *op. cit.*, p. 144. In the United States the percentages of energy output from mineral fuels and water power, work animals, and human workers, respectively, were: in 1850, 5.8, 78.8, and 15.4; in 1930, 83.7, 11.7, and 4.6; estimated for 1960, 96.3, 1.3, and 2.4 (Dewhurst, *op. cit.*, p. 787). In 1850, of the energy from sources other than work animals, about 73 per cent came from human workers; in 1930, 5.2; in 1960, 2.4. Income per capita was much higher, of course, in 1850 America than in 1929 China, in part because both the work animal and the land supply per worker were much higher.

[139] Data from Moore, *op. cit.*, p. 276.

[140] *Economica*, XII, 1945, pp. 164–70.

[141] *Economics*, pp. 72–74. "Capital" is defined to include dwelling-houses and useful publicly-owned assets, but to exclude land and non-income-yielding personal possessions (*ibid.*, p. 72).

[142] Clark states that the rise in income in Australia in the face of an essential constancy in the capital:worker ratio runs counter to "the commonly held supposition that increases of population relative to natural resources in newly settled countries are bound to reduce the average return per unit of labour and capital" (*ibid.*, p. 74). He fails to note that the *ceteris paribus* condition did not hold in Australia; for changes were taking place in productive methods, and possibly the population was approaching more closely to the optimum number.

[143] See Clark, *Conditions*, p. 389.

[144] A first degree curve does not fit the 1913 data so well as would a higher degree curve. Capital does not include land (*ibid.*, p. 389).

must fall (*ceteris paribus*) to a very low level if population continues to increase relatively to capital, [145] continuous population growth is feasible only if the supply of capital (i.e., of resources other than land which was treated in subsection [a]) can be sufficiently augmented. If this cannot be done, dynamic changes in the methods of production will be offset by the effects of population growth, per capita income will fall, and eventually population growth will cease.

The rate at which capital (other than land) per worker can be increased is conditioned by a number of circumstances, among them (1) the ratio of population to resources, (2) the rate at which population grows, and (3) the augmentability of available mineral and fuel supplies. (1) The per worker capital growth rate is conditioned by the population:resources ratio because the rate of capital formation per worker is conditioned by the magnitude of per worker income, which is governed by the population:resources ratio. Clark's data suggest that, if $y =$ saving and $x =$ real income in I.U. per occupied person by country, $y = -19 +$ .136x for incomes under 1,000 I.U.; beyond 1,000 the curve bends downward slightly, giving a lower value for the coefficient of x.[146] (2) The population growth rate, when positive, diverts to the formation and equipment of new increments of population labor and resources which might otherwise have been employed to produce consumer goods or to increase the equipment of the given working population (and their replacements).[147]

[145] As in the case of the substitutability of labor for land, what is important is not that t' ᵗarginal yield must eventually fall to zero, but that it must fall so low as to make furtʰ ʳr population growth impossible.

[146] *Economics*, chap. 6 and chart facing p. 118. Although Clark's figures relate to many countries and extend over a number of decades, they are suggestive. See also *Conditions*, chap. 11, esp. p. 406, and note 151 below.

[147] Let $A =$ average direct cost of producing an adult; $B =$ average cost incurred in producing those individuals who die before reaching maturity; $C =$ average total cost (including indirect costs) of producing an adult worker; $n =$ number of individuals per year who become productive workers; $n' =$ number of individuals who attain maturity but do not become productive workers; and n'' number of individuals per year who would have attained maturity but who died before reaching a productive age (see Bowen, *op. cit.*, cited in note 44). Then

$$C = \frac{A\,(n + n') + Bn''}{n}$$

Now subdivide n into n_r and n_i; n' into n_r' and n_i'; and n'' into n_r'' and n_i''. The subscript r indicates that the component bearing it represents the number required for replacement purposes; and the subscript i, that part of n_1, n_1', and n'', respectively, which contributes to the *increase* of the working population. (For the sake of simplicity it is assumed that the ratio of the replacement component to the increase component is the same in each of the three categories n, n', and n''. The total cost T_c of population growth equals R_c, the replacement, cost, plus I_c, the cost of the additional increment, with $R_c = n_r C = A(n_r + n_r') + Bn_r''$ and $I_c = n_i C = A(n_i + n_i') + Bn_i''$). The productive effort of the labor and resources which is transformed into I_c could otherwise be transformed into additional equipment for the then supposedly constant population. The greater the ratio of I_c to T_c, the more difficult, *ceteris paribus*, is it to increase the capital:worker ratio.

For a practical illustration of the influence of population growth upon capital requirements, given a desired rate of progress, see Stern, *op. cit.*, pp. 169–70.

For propositions (1) and (2) we have some empirical evidence.   The per capita amount of capital equipment is positively associated with per capita income, by country, presumably because continued lowness of per capita income (whatever be its causes) makes for sparseness of savings and capital formation.[148]   Analysis of some data presented by Clark indicates a slight association between lowness of population growth rate and highness of absolute rate of growth in income, by country.[149]   Some corroborative evidence is supplied also by Leon Goldenberg in a comparative study of France, Germany, and the United Kingdom.[150]   The population growth rate both before 1870 and in 1870–1914, was much lower in France than in the other two countries.   "Before the 1870's [France] excelled in the per capita accumulation of wealth as compared with England and Germany." Between 1870 and 1914 wages, per worker output, and the fraction of annual income saved, were somewhat lower in France than in the other two countries; nonetheless, because population growth absorbed a smaller proportion of savings in France, per capita wealth in France continued to grow and in 1914 was similar to that in Great Britain and superior to that of Germany.[151]

(3) While it may be possible to augment the *available* supply of fuel and mineral resources as population grows and/or per capita consumption rises, it is not possible in all instances to countervail what we have called the law of increasing economic entropy,—i.e., to circumvent the process of depletion by which fuel and mineral reserves are reduced.   This inability is unimportant so long as fuel and mineral reserves of the first order are adequate, but it becomes important as a deterrent to income creation and capital formation when the depletion process exhausts the supply of a nonreplaceable mineral, or (what is more usual and of greater practical significance) increases the cost of extracting a mineral.[152]

[148] Some relevant data are given in Clark, *Economics*, pp. 73, 77, 81–87. See also E. Staley, *op. cit.*, chap. 4 and appendix.

[149] Clark reports for 1913–30 the percentage increase in working population (let us call this x) and in potential real income per head (let us call this y) for 24 countries (*Conditions*, p. 151).   The rank coefficient of correlation between y and x for the 24 countries is $-.226 \pm .114$; when Canada, Australia, U. S. A., Spain, and Japan are excluded, the correlation becomes $-.28 \pm .15$.   The rank coefficient of correlation between y and the actual increments in income per head is $+.914 \pm .024$.   The coefficient of correlation between x and the *increments* in per capita income is about -0.41 ± 0.20; only about one-sixth of the variance in income increment is explainable in terms of variation in x, the large balance being attributable to other circumstances.   In the period 1913–30, a period marked by war and disturbance whatever influence the population growth factor may have exercised was practically swamped by other factors. See below, note 160 and text.

[150] *Quarterly Journal of Economics*, LXI, 1946, pp. 40–65.

[151] *Ibid.*, p. 53.   "The wider dispersion of income in France was one of the factors that led to lower national savings (*ibid.*, p. 54)."   During the two decades preceding 1914 about one-half of French savings, one-fourth of the British, and only about one-tenth of the German were invested abroad (*ibid.*, pp. 160–61).   Goldenberg attributes this largely to the supposed fact that since France's population was growing slowly, there was less opportunity for investment and less need for savings in France than in the other two countries (pp. 61–62).   See also Clark's chart facing p. 147 of *Conditions*.

[152] For a description of the depletion process, see *Recent Social Trends*, I, pp. 77–85.   Its effect is illustrated with respect to gasoline in a chart (see *The Lamp*, XXIX, 1947, p. 11) which indicates the estimated cumulative quantities of gasoline available in the United

For then relatively more of a nation's productive power must be shunted into mineral production to accomplish a given objective, with the result that less is available for other purposes.   Moreover, if a given mineral is no longer available and not replaceable, the composition of consumption must change, presumably to the disadvantage of consumers.

We have relatively little empirical evidence to illustrate what has been said, for mineral output per mine worker generally remains high, while countries with mineral deficiencies can make them up through importation.   It must be remembered, however, that only in the second half of the nineteenth century did the modern economy become so completely founded upon minerals as it presently is, and that consequently the depletion process has not long had opportunity to be operative.   Already in 1937 world mineral production was seven times what it had been in 1880, while American production was nearly 12 times what it had been 57 years earlier.   Moreover, since mineral production and consumption

States from oil, natural gas, tar sands, oil shales, and (chiefly, 97 per cent) coal at the following service station prices (in trillions of barrels): up to 26¢, 0.3; up to 31¢, 3.8; over 36¢, 3.9.   In Great Britain the depletion process had, by 1933–37, when about 94 per cent of the original coal reserve still remained, increased the purchasing power of coal in terms of all other goods about 143 per cent above the 1833–37 level (see *Recent Social Trends*, I, p. 89, and H. W. Singer, *Review of Economic Studies*, VIII, 1941, p. 166).

The effects of the depletion process cannot be predicted with certainty or precision. Increased use of scrap metal may ease the pressure of need.   Discoveries of fresh deposits and technological advances (which frequently are stimulated by rising costs) may long counterbalance the operation of diminishing returns originating in the depletion process and even, as in the United States, increase per worker output greatly. "Nevertheless, however favorable the technological situation is today, it would seem that, if one takes a long enough view, the effects of depletion must eventually be of a kind which cannot be fully offset, as they have been so frequently offset in the past, by changes in mining methods. . . . Eventually exhaustion of deposits must occur, and productivity becomes zero as the industry closes down.   A more reasonable expectation is a gradual failure of technology adequately to offset the effects of depletion.   But this may happen only in the very long run. . . . If a stage of falling productivity must eventually be reached, the American mineral industry is too young, or our period of study is too short, for us to observe it."   For at present output per worker, despite occasional declines in the past, is close to its all-time high.   See H. Barger and S. H. Schurr, *The Mining Industries, 1899–1939*, p. 254, also chap. 4 and pp. 255–65.

A statement made in 1928 by Robert A. Millikan illustrates the hazards of prophecy with respect to new supplies. "The energy available . . . through the disintegration of . . . atoms may perhaps be sufficient to keep the corner peanut and pop-corn man going, . . . but that is all."   (cited in *Recent Social Trends*, I, p. 73 n.)   Yet, less than two decades later, it was estimated that atomic power could be produced to compete with coal at $10 per ton, and indicated that "nuclear power plants would make feasible a greater decentralization of industry" and the exploitation of "fields of application not open to other types of power-producing plants."   See *Atomic Energy*, U. S. Department of State Publication 2661, 1946, pp. 125–27; also J. Marschak, *Bulletin of the Atomic Scientists*, II, 1946, pp. 8–9.

Land degradation is a form of depletion which, while it may be controlled, is diminishing the effective land supply (Bertram, *op. cit.*, pp. 202–203).   Irrational exploitation of organic sources of food and materials has a like effect (*ibid.*), but can be checked through countermeasures (e.g., see the USDA 1946 Forest Service report, *Gaging the Timber Resources of the United States*).

have been closely associated with industrialization, it may be assumed that mineral consumption in the future will grow nearly as fast as the output of world industry.[153] Finally, in proportion as per capita mineral consumption in the rest of the world approaches the American level, and the American level continues to rise, the rate of depletion will be accelerated. In fact, had the whole world consumed minerals at the American rate in 1937, world consumption would have been about eight times what it was.[154]

The present mineral situation of the United States may serve to indicate what is in store in the future. In 1937 the United States consumed about one-half of the world output of minerals but produced only 42, 27, and 47 per cent, respectively, of the global supply of metals, of fuels, and of metals and fuels combined. It imported a fraction (often considerable) of 26 minerals and exported eight.[155] Although the commercial reserves of a number of minerals suffice to meet prospective American consumption requirements for a century or more, the reserves of many others are close to exhaustion.[156] While imported minerals may take the

[153] Growth indexes for the world and the United States for industrial, mineral, metal, and fuel production are given in Table A, based upon C. K. Leith, J. W. Furness, and C. Lewis, *World Minerals and World Peace*, Appendix A:

TABLE A

YEAR	PRODUCTION						
	World				United States		
	Industrial	Metals & Fuels	Metals	Fuels	Metals & Fuels	Metals	Fuels
1880	18	15.2	16.4	14.8	8.8	8.9	8.8
1900	42	36.4	37.6	36.0	78.9	34.0	27.7
1929	100	100.0	100.0	100.0	100.0	100.0	100.0
1937	119	112.5	115.8	111.3	101.3	91.1	103.8

It is expected that the recent tendency for mineral consumption to lag slightly behind national income will continue into the future (see Dewhurst, *op. cit.*, pp. 593 ff.).

[154] In 1937 the United States with about 6 per cent of the world's population consumed about one-half of the world's mineral output (National Resources Planning Board, *Industrial Location and National Resources*, pp. 150-51). By 1960 American per capita mineral consumption may be one-fourth higher than in 1937 (estimated from Dewhurst, *op. cit.*, p. 593).

[155] Production of four minerals approximately balanced consumption. See NRPB, *Industrial Location* etc., pp. 150-51, 152; C. K. Leith *et al*, *op. cit.*, pp. 214, 221.

[156] Reserves fall into two categories, the commercial, and the submarginal and highly speculative. At the 1935-39 annual consumption rate commercial nitrogen reserves will last for an indefinite period, and submarginal reserves for over 500 years. Corresponding periods for other minerals are: magnesium, indefinite and over 500; salt, indefinite and over 500; phosphate rock, 805 and over 500; potash, 117 and over 500; molybdenum, 422 and 100-500; iron ore, 111 and over 500; sulfur, 55 and over 500; fluorspar, 40 and 5-25; copper, 34 and 5-25; zinc, 19 and 5-25; petroleum, 18 and 25-100; cadmium, 16 and 5-25; gold, 14 and 5-25; lead, 12 and under 5; silver, 11 and 5-25; bauxite, 9 and 100-500; vanadium, 7 and 100-500; antimony, 4 and under 5; tungsten, 4 and 5-25; platinum, 4 and under 5; mercury, 3 and 5-25; asbestos, 3 and 5-25; manganese, 2 and 100-500; chromite, 1 and 5-25.

place of domestically exhausted minerals, they can do this only so long as foreign reserves are unexhausted and accessible; and they can do this at present terms of trade only so long as foreign consumption is not greatly stepped up.[157]

The available data suggest that the mineral situation of both the United States and the rest of the world is more likely in time to become worse than better. Population growth will accentuate this tendency as will efforts to improve living conditions in countries which are now overpopulated.[158]

Continued population growth makes more difficult the relief of population congestion in agriculture, itself in part the consequence of the general pressure of numbers upon resources. At present about 60 per cent of the world's 800 million gainfully employed are engaged in agriculture; yet today about 40 per cent and eventually 15–25 per cent of this number, if properly trained and equipped, could produce the present world agricultural output and much more in addition.[159] Reduction of the percentage of workers employed in agriculture to 30 in the Western Hemisphere and to 40 in Europe, Asia, and South Africa, Bean estimates, would increase per capita and aggregate incomes in the 20 countries concerned about $120 and $150 billion, and world income about 60 per cent. Equipping the estimated some 190 million transferring workers involved at an outlay of 1,600 I.U. (or 1925–34 dollars) per worker would cost about 310 billion I.U.'s, with the cost falling most heavily upon the countries at present least well equipped.[160] The problem of providing capital for the transfer of excess agricul-

Bituminous coal and lignite commercial reserves will last 4,300 years; anthracite, 195. Submarginal reserves of flake graphite may last 25–100 years; mica (block) and nickel, 5–25; industrial diamonds, quartz crystals, and tin, under 5. See E. W. Pehrson, "The Mineral Position of the United States and the Outlook for the Future," reprinted from *Mining and Metallurgy*, April 1945, p. 4, also p. 3. On oil see L. M. Fanning, *Our Oil Resources*, pp. 115–16, 136, 149, 159, 207. Estimates based upon sedimentary rocks suggest a 100–300 year United States oil supply.

[157] At present the principal minerals in which the United States is deficient are produced chiefly in less industrially advanced countries. See *The Index*, winter issue, 1946, p. 196. In 1943 world petroleum reserves sufficed for world needs for about 25 years. Yet North American coal, oil shale, and tar sands resources were deemed adequate to produce over seven trillion barrels (3,000 or more years supply); and it was estimated that 5–10 million acres of sugar cane would suffice to produce liquid fuel for 30 million prewar automobiles (Fanning, *op. cit.*, pp. 115–16, 159, 136). (Since 1920 the replacement of draft animals on the farms alone has released 25–30 million acres.)

[158] The full peacetime significance of nuclear, solar, tidal, and similar power sources remains to be determined and is not here taken into account.

[159] By 1960 the percentage of the United States labor force engaged in agriculture will approximate 11.5; it was 17.3 in 1940, 42.6 in 1890, and 58.9 in 1860 (Dewhurst, *op. cit.*, p. 621). This decline originates in the fact that whereas physical productivity per worker in agriculture has nearly kept abreast of that in the balance of the economy, the income elasticity of demand for agricultural products is lower. Cf. H. A. Simon, *Econometrica*, XV, 1947, pp. 31–42. The remainder of the above paragraph is based upon L. H. Bean's essay in *Studies in Wealth and Income*, VIII, Part Five, and Clark, *Economics*, pp. 28–30, 71, 73, 80–81.

[160] Bean's estimates center about 1940. Clark's respective estimates (for 1945) of workers (in millions) to be transferred out of agriculture and of the prewar stock (in billion I.U.) of capital of the transferring areas are: Asia, 148.8 and 183; U.S.S.R., together with the Balkans, Hungary, and Poland, 36.9 and 112.7; Latin America, 4.2 and 61.4; rest of

tural workers out of agriculture is intensified by the fact that by 1955 the world's working population will have increased about 86 millions beyond the 1945 level, with about three-fourths of this increase taking place in countries marked by agricultural overpopulation.

It is commonly held at present that industrialization can ease the poverty of those parts of the world in which the pressure of numbers upon resources is great and, by urbanizing the population and introducing the modern pattern of values, bring population growth under control in these areas. This argument presupposes, among other things: (a) that the supply of agricultural raw materials and foodstuffs can be increased sufficiently to meet the requirements of the much larger population which the industrialization process will bring into being before the growth of numbers is checked;[161] (b) that capital can and will be accumulated in sufficient quantities to permit the necessary industrialization;[162] and (c) that an adequate supply of the requisite minerals can be obtained. In view of the difficulties regarding the increase of resources and food supply noted in this section, it is likely that it will take most of the countries marked by population pressure many years to win relief from poverty even though their population growth rate falls to zero.[163]

VIII

The materials in this section, most of which are by country and appear in Table VII, support the argument of the preceding sections.

Although the annual population growth rate varies widely from one continent to another, ranging at present from about one-half of 1 per cent in Europe to

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Europe 3.1 and 55.3. The corresponding figures for Africa are 28 and 44.8. The amount of capital required to equip the transferring workers (at 1,600 I.U. each) divided by Clark's estimate of the prewar stock of capital is as follows for the affected areas: Asia, 1.28; U.S.S.R. etc., 0.5; Latin America, 0.2; rest of Europe, 0.1; Africa, 1.4 (if Staley, [op. cit., chap. 4] is correct in believing Clark's capital estimate for Asia too high, the Asia ratio will exceed 1.28).

The 1,600 I.U. estimate employed above is close to that estimated for Czechoslovakia in the 1930's by Clark. P. N. Rosenstein-Rodan estimated at £300–350 per head the cost of industrializing Eastern Europe (Economic Journal, LIII, 1943, pp. 210–11).

[161] See notes 103–06 above.

[162] Judging by the experience of the past century, 5–20 per cent of a national income may be saved and invested (see Clark, Conditions, p. 406; Goldenberg, op. cit.). The proportion saved in the future will probably be less, since underlying populations are less docile than formerly, unless vigorous state intervention can augment the proportion saved without depressing aggregate income. Rosenstein-Rodan estimated the cost of industrializing Eastern and Southern Europe at £6 billion, or three times the annual income of this area (op. cit., pp. 210–11); accomplishing this through domestic savings would probably take 20–25 years. S. K. Iyengar estimated that "the initial capital requirements of a 'zero' programme for India would require one-tenth of the national income for ten or more years" (Economic Journal, LIV, 1944, pp. 200–01). This estimate is too optimistic, for 10 per cent of the national income will serve to equip at $800 a worker only slightly over one-half the annual increment in working population, with the result that the excess workers in agriculture cannot be equipped. On China and the Far East see Staley, op. cit., chap. 4.

[163] Concerning other difficulties attendant upon industrialization, see Hilgerdt, Industrialization, chap. 4; Buchanan, op. cit., and his illuminating essay in Economic Journal, LVI, 1946, pp. 533–53; also B. A. Rahmer, ibid., p. 662.

about two in Latin America, the world growth rate has not yet changed much. It was 29.2 in 1800–50, 45.9 in 1850–1900, and 44.8 in 1900–1950; it may approximate 41–43.6 in 1950–2000. Present forecasts assume a decline in the rate of increase in the closing third of this century, with rates of 29.1 in 1900–36, 44.5 in 1937–70, and 11.5 in 1970–2000. By 2000 world population, which numbered 2,251 millions in 1946 and will number about 3 billions in 1970, may number about 3.35 billions. Even at that date the (assumed) lowness of the population growth rate in large sections of the population will probably be the result of an equilibration of births and deaths at a mortality level still sufficiently high to permit appreciable increase. In view of these growth prospects, of the already widespread lack of foodstuffs, and of the imminent shortage of low-cost supplies in some mineral fields, it is likely that the exchange value of foodstuffs and minerals will rise appreciably in the present century.[164]

In terms of growth potential the countries of the world fall into three classes, according to Thompson: (I) those in which birth and death rates are largely under control; (II) those in which natality and mortality are passing under control even though mortality has fallen faster than natality; and (III) those in which neither mortality nor natality "has come under reasonably secure control." In 1935, according to Clark's figures, the number of millions and the percentage of the world's population living in each class of countries were: I, 424 and 20.2; II, 430 and 21; III, 1,230 and 58.8. The population of the I countries will reach a peak in the neighborhood of 470 millions within a decade and slowly decline after 1970 if not before. That of the II countries may slightly exceed 600 millions by 1970, and by 2000 aggregate 700 millions; that of the III countries may approximate 1.9 and 2.2 billions respectively, by 1970 and 2000.[165] The percentages of the world population in I, II, and III countries therefore will run something like this in the future: in 1955, 19.3, 21.1, and 59.6; in 1970, 15.6, 20.2, and 64.2; in 2000, 13.5, 19.5–21.1, and 65.5–66.7.

The population of class I countries is relatively wealthy, urban, nonagricultural, and healthy while that of class III countries is poverty-ridden, rural, preindustrial, and (often) sickly; that of the class II countries, by comparison, is intermediate and transitional. The *relative* order of magnitude of per capita capital equipment, Clark's very rough estimates suggest, is something like this:

[164] The population data presented in this section are taken or estimated from F. W. Notestein's essay in T. W. Schultz, *op. cit.*, pp. 36 ff.; OIR Report No. 4192, *World Population Estimates* (Department of State, 1947); W. S. Thompson, *Plenty of People*, and *Population and Peace in the Pacific;* and A. M. Carr-Saunders, *World Population*. Gross and net reproduction and expectation of life at birth values are reported periodically in *Population Index:* e.g., see XI, 1945, pp. 150 ff., 249 ff., XIII, 1947, 88–94; see also on China, A. J. Jaffe, *Human Biology*, XIX, 1947, pp. 6–8, and on Egypt and India, F. W. Notestein, ed., *Demographic Studies of Selected Areas of Rapid Growth*, pp. 47 ff., 118–19. Iceland is included with Denmark; Luxemburg with Belgium; Albania with Yugoslavia; Cyprus with Turkey; Formosa with China; and the rest of Oceana with the rest of Africa. We use Clark's 1925–34 income estimates because they are internationally comparable and (abstracting from the effect of war) representative of international differences (cf. data in *Population Index*, XIII, 1947, pp. 100–101).

[165] The margin of error in prediction probably is greater for II than for I countries, and much greater for III countries where the checks are more "Malthusian" in character.

TABLE VII*

COUNTRY (1)	POPULATION (1946) (MILS.) (2)	PRIMARY WORKERS (%) (3)	INCOME PER WORKER (1925-34) (4)	HECTARES PER 100 PEOPLE (5)	CAPITAL PER WORKER (6)	AGRIC. YIELD PER		CALORIES PER HEAD		
						Male Farm Worker (7)	Hectare (8)	All (9)	Animal (%) (10)	Cereal & Potato (%) (11)
1 United States....	142.7	19	1381	113	429	661	16.5	3249	35-40	30-40
1 Canada..........	12.7	35	1337	243	353	618	21.6	3109	35-40	30-40
1 New Zealand.....	1.8	27	1202	481	382	2444	48.8	3281	45-50	30-40
1 Great Britain....	49.7	6	1069	42	405	475	33.3	3005	40-45	30-40
1 Switzerland.......	4.5	21	1018	53	279	433	71.9	3049	30-40	30-40
2 Argentina........	14.6	23	1000	1228	313	1233	8.6	3275	30-35	50-60
1 Australia........	8.5	24	980	221	404	1524	10.7	3128	40-45	30-40
1 Netherlands......	9.5	21	855	28	243	579	13.6	2958	30-40	40-50
1 Eire.............	3.0	53	707	157	223	292	36.2	3184	30-35	50-60
1 France..........	41.1	25	684	83	228	415	55.6	3012	25-30	50-60
1 Denmark.........	4.5	36	680	83	228	642	93.7	3249	35-40	40-50
1 Sweden..........	6.8	32	653	78	228	352	60.1	3052	35-40	30-40
2 Uruguay........	2.3	44	650	...	313	1000	23.0	2902	35-40	50-60
1 Germany........	66.5	24	646	42	223	490	79.4	2967	20-25	40-50
1 Belgium.........	8.7	17	600	22	206	394	151.9	2885	25-35	50-60
2 Spain...........	27.7	57	550	63	158	244	27	2788	10-15	60-70
3 Chile...........	5.5	38	550	402	...	...	...	2481	15-20	60-70
1 Norway.........	3.1	35	539	36	198	288	88.2	3129	35-40	40-50
1 Austria..........	7.1	25	511	65	...	332	78	2933	30-40	40-50
1 Czechoslovakia...	12.3	27	455	55	132	287	58.8	2761	25-35	50-60
2 Brazil..........	47.2	75	435	31	...	...	...	2552	25-30	60-70
2 Greece..........	7.7	44	397	34	87	125	35.3	2523	10-15	60-70
1 Finland.........	3.9	51	380	90	150	182	46.9	2950	25-35	40-50
3 Philippines......	18.5	75	375	25	...	64	53.8	2021	10-15	80-90
3 Mexico..........	23.0	68	360	435	...	...	...	1909	10-20	60-70
3 Palestine........	1.9	53	360	64	...	...	...	2570	15-20	60-70
1 Hungary.........	8.9	54	359	84	123	195	44.4	2815	15-20	50-60
2 Japan............	76.0	50	353	14	113	120	104.2	2268	10-15	70-80
2 Poland...........	22.6	62	352	75	100	195	40.2	2702	15-20	70-80
3 Rest of America..	57.0	72	350	...	120	...	...	2200	10-20	60-80
1 Latvia..........	2.0	52	345	195	100	268	40.8	...	25-35	50-60
1 Italy...........	46.0	43	343	49	122	176	35.2	2627	10-15	60-70
2 Portugal.........	8.3	48	342	...	111	137	24	2461	10-15	60-70
1 Estonia..........	1.1	52	341	258	100	268	21.2	...	25-35	50-60
2 Yugoslavia.......	16.8	79	330	95	87	112	35.2	2866	10-20	70-80
3 Egypt...........	18.2	67	325	34	...	...	...	2199	5-10	70-80
2 U. S. S. R........	187.3	74	320	368	94	112	7.2	2827	10-15	80-90
2-3 Algiers...........	8.4	...	300	364	...	...	...	2236	5-15	70-80
2-3 South Africa......	11.4	85	276	76	...	...	...	2300	20-25	60-70
2 Bulgaria........	7.0	67	259	65	87	143	40.4	2831	10-15	70-80
2 Roumania........	15.9	65	243	95	87	137	35.2	2865	10-15	80-90
1 Lithuania........	2.6	65	207	155	100	192	35.2	...	15-25	60-70
3 Turkey, Syria....	22.5	73	200+	47	...	81	39.6	2590	10-15	60-70
2-3 Morocco, Tunisia.	13.1	...	200+	239	...	...	...	2342	5-15	70-80
3 India.............	414.0	62	200	47	48	127	41.7	2021	5-10	80-90
3 China, Korea....	457.9	75	110	26	15	46	...	2201	1- 5	80-90
3 Dutch Indies.....	72.0	73	200-	13	32	...	...	2040	1- 5	80-90
3 Rest of Asia....	124.0	72	200-	...	32	...	...	2080	5-10	80-90
3 Rest of Africa....	124.0	85	200-	...	48	...	...	2300	10-15	80-90

* See note 167 for sources and explanation.

I, 100; II, 39; III, 11.   Per capita land equipment in many of the class III countries approximates the half-acre reported for Asia (Table VI, cols. 4–5); in the I and II countries it is three or more times as great.   Of the occupied population in I about 22 per cent were engaged in agriculture; in II, 56.6; and in III, 74.7.   Income differentials reflect these equipment and occupational differentials.   In 1925–34, 58.2 per cent of the world's income went to people living in class I countries, 20.4 to II, and 21.3 to III.   Per capita income in the I, II, and III countries approximated, respectively, 350, 118, and 44 I.U.   Food consumption differentials reflect these income differentials (see Table VII, cols. 9–11).   In all but two class I countries 20–40 per cent of the calories consumed are of animal origin; in but one is this percentage as low as 10–15.   In all but the more favored South American and South African members of class II, this percentage approximates 10–15, while in the large class III countries it is close to or below 10.   Whereas but two class I countries draw as much as 60–70 per cent of their calorie consumption from cereals and potatoes, many of the III countries get more than 80 per cent from this source, while all but two class II countries fall in the over-60 class.[166]   Moreover, per capita total calorie consumption is somewhat lower in the III countries than in the others.   It is not surprising, therefore, that expectation of life at birth is lower in the II than in the I countries, and much lower still in the III countries.[166]

What has been said is supported by the data presented on an individual country basis in Table VII.[167]   The countries in which population growth is not under effective control (and which contain over one-half the world's population [cols.

[166] In the I countries expectation of life at birth is above 55, usually about 60; in II countries it is above 45.   In India, Egypt, and China it is in the neighborhood of 30–32; in representative class III Latin American countries, around 37–42.   Life expectation is logistically associated with income, by country (*Population Index*, XIII, pp. 100–103).

[167] Explanation of Table VII and its sources: The Arabic numeral 1, 2, or 3 designates the population growth class (I, II, or III) into which the country falls (col. 1).   In col. 2 population (by millions) as of 1946 is presented as given in the OIR report cited in note 164.   In col. 3 is given the percentage of workers in primary occupations as estimated by Colin Clark; the italicized figures, taken from or based on Hilgerdt (*op. cit.*, pp. 26–27), are not quite comparable with Clark's for other countries.   In col. 4 income per breadwinner in I.U. in 1925–34 is given as estimated by Clark, with conjectural figures italicized.   In col. 5 is given the number of hectares in fields, meadow, and pasture per 100 inhabitants as of 1937; italics indicate that a country imports considerably more food than it exports.   The figures are principally from German Institute for Business Research, *Weekly Report*, Feb. 9, 1939, pp. 17–18, and occasionally from the USDA's *Agricultural Production and Trade by Countries*, 1945.   The index values for roughly estimated capital per worker given in col. 6 are calculated from Clark, *Economics*, p. 80.   The figures on agricultural output per male farm worker (col. 7) and per hectare (col. 8) are taken or estimated principally from Clark, *ibid.*, pp. 42–43, 65, and *Conditions*, pp. 244–46.   The italicized figures are rough approximations, particularly in col. 8, obtained by splicing Moore's (*op. cit.*, pp. 35, 42), and Clark's estimates.   The figures in col. 9 (taken from FAO, *World Food Survey*, pp. 37–39) represent calories "as purchased" at retail level; corresponding figures for calories actually consumed will be less by the amount lost between the retail level and final consumption.   Col. 10, giving the percentage calories of animal origin form of all calories available, and col. 11, giving the corresponding percentage for cereals and potatoes, are estimated from *ibid.* when not reported by Tolley (*op. cit.*, p. 165) or Bennett (*Wheat Studies*, XVIII, p. 73).   I have italicized the estimates.

1–2]) are marked by agricultural overpopulation (col. 3) and often by a shortage of capital and agricultural land (cols. 5–6).   These circumstances, in turn, make for smallness of agricultural yields (cols. 7–8) and lowness of income (col. 2). Lowness of income limits capital formation and holds down the rate at which workers can transfer from agriculture into other activities.   The estimates of calories available per capita at the retail level (col. 9) indicate that consumption is low in most of the countries marked by population pressure and high fertility.[168]   The smallness of the percentage of calories got from animal foods in many II and III countries, and the largeness of the percentage drawn from cereals and potatoes (cols. 10–11) indicate that no further replacement of derived by primary calories is feasible, since minimum dietary standards already are being violated.[169]

The evidence presented in Table VII and elsewhere in this paper lends no support to the easy optimism of those who see in industrialization a simple and ready solution for the overpopulation that already affects more than half the world.   Countries marked by intense overpopulation must virtually raise themselves by their own bootstraps.   They lack land, capital, and the opportunity to make up this lack.   They can get only limited relief through trade and capital imports.   In part because of the pressure of the inhabitants of these countries upon their resources, the composition of their food consumption operates to impair health and make inadvisable any further substitution of primary for derived nutrients.   The salutary influence of such improvements as are effected in these countries is shortlived when the resulting decline in mortality is not adequately compensated by a decline in natality.[170]

Given present technological prospects, together with the current world income and resource situation, a speedy cessation of world population growth appears to be essential to the gradual alleviation and removal of widespread poverty. Social and economic programs which fail to take this condition into account are almost certainly doomed to fail, howsoever skillfully they may be clothed in the rhetoric of latterday sentimentalism and credulity.

[168] The gross reproduction rate, which reflects growth potential better than does the net reproduction rate, in recent years was in the neighborhood of 3 in Egypt, China, and India, and above 2 in Chile and Mexico. Presumably, similar rates obtain in similar class III countries. On the Malthusian character of Chinese population growth see C. M. Chiao, W. S. Thompson, and D. T. Chen, *An Experiment in the Registration of Vital Statistics in China.*

[169] E.g., see Wickizer and Bennett, *op. cit.,* pp. 129–32, and chap. 7 of the League of Nations report cited in note 68 above.

[170] Let x = the annual number of births in a country, and e = the expectation of life at birth. Population tends roughly to stabilize at ex. If e increases markedly while x remains constant or declines only slightly, the magnitude of ex increases greatly. Since the expectation of life of much of the world's population is below 40, even though 70 is being closely approached in advanced lands, there is room for a great increase in ex unless x declines. If the economic and related fetters upon population growth in representative class III countries were removed, logistic upsurges might be initiated similar to that which carried the Japanese population from a long stationary 28–30 millions to a new equilibrium figure about three times as large in the 125–50 years succeeding 1850.

WHAT IS RESPONSIBLE WAGE POLICY?

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I

The two cornerstones of economics are the scarcity of resources and the multiplicity of wants. True economy consists of deriving maximum want satisfaction from available resources. This requires that resources be allocated into proper channels and combined in proper proportions.

Economic theory is equipped with a battery of functions expressing consumer preferences and input-output relationships, and a principle of maximization applying to the consumer, the owner of productive resources, and the entrepreneur. The supply of productive resources is assumed to be given. The interplay of supply and demand then determines the prices of commodities and resources, the allocation of resources among alternative uses, and the distribution of the resulting income.

Attention is often directed to the role of price in controlling economic activity. Under certain special circumstances, free pricing leads to optimum results. Scarce resources are truly economized and satisfaction is truly maximized. The workings of celestial mechanics as described by Kepler are no more symmetrical and harmonious than the pricing system as portrayed in the theory of competitive equilibrium.

Competent scholars are careful to indicate that the optimum results are conditioned upon the underlying assumptions of full employment, rational behavior, and competitive markets. They frequently apologize because the "real world" corresponds so poorly with the postulated environment of price and output decisions. On occasion, however, the theory of a competitive economy is pressed into the service of partisan and political debate. On these occasions there is frequently a failure to note that the theory is addressed to the operation of a stationary, frictionless, competitive economy. Illegitimate applications of competitive theory are not limited by any means to the popular tracts of Hayek and Hazlitt.

These facts are familiar enough. Nevertheless, they are pertinent in another context—the problem of collective wage determination. Economic analysis is frequently utilized in an attempt to provide a normative standard for the resolution of bargaining disputes and a test of responsible behavior, but here again is encountered the same classical error of failing to test assumptions against reality before offering policy recommendations.

Collective wage determination is very different, of course, from competitive wage-setting. Over a large sector of the economy, impersonal market forces have been supplanted by conscious human decision. Wage-determining tendencies under collective bargaining run in different orbits from the classical tendencies of a competitive labor market. Supply and demand are still encountered

in the labor market, but they are of little consequence for the setting of wages; they adjust to the price of labor, rather than determine it.

Nevertheless, certain similarities remain. If supply and demand do not establish price, at least they adjust to it. It would still be desirable if resources could be utilized in such a manner as to yield the greatest total satisfaction. The wage bargain retains a significant economic function in governing the allocation of labor among alternative lines of employment. Results which formerly flowed from the pricing mechanism in the labor market are now brought about by the authoritative decisions of employers and trade unions.

Although a wage rate has two aspects (cost to the employer and income to the worker), attention is usually centered on the cost aspect; since an individual collective agreement covers only a minor segment of the economy, the income effect is very small. As cost of production, the wage rate is taken into account by the employer in deciding what scale of output and what combination of resources will maximize his profit.

If this formulation is valid, it follows that the wage bargain is really a wage-employment bargain. Slichter states that "the wages embodied in trade agreements affect the capacity of the enterprise and industry to give employment, and they affect the distribution of employment among different occupations, industries and places."[1] In a discussion of "functions of the wage system," Dunlop remarks that wage and salary rates "help to determine the amount and qualities of labor services that are called into the labor market, and into its numerous specialized categories of skill and location. Wage and salary rates through their impact on costs have decisively affected the distribution of employment among industries, firms, and occupations. The impact on the geographical distribution of employment among different regions, different sized cities, and as between metropolitan and outlying districts has been no less significant."[2]

Now what about the optimum results, the balanced, harmonious allocation of resources, that are supposed to emerge in a competitive society? There is a strong temptation to assign to the individuals involved in collective wage determination the responsibility of achieving optimum results, and to exercise normative judgment upon their behavior in the light of their success or failure in doing so. The central argument of this article is that only under certain rigid assumptions can union and employer representatives be held reasonably accountable for the volume of employment resulting from their wage decisions; that these assumptions are often forgotten in the analysis of specific bargaining disputes; and that in the normal state of affairs the wage bargain is not a wage-employment bargain at the time it is made.

Normative judgments bear most heavily upon the union. There are many concepts of "union responsibility"—the observance of contract commitments,

[1] Sumner H. Slichter, *Basic Criteria Used in Wage Negotiations*, p. 8.

[2] John T. Dunlop, "American Wage Determination: the Trend and its Significance," a paper read before Chamber of Commerce Institute on "Wage Determination," Washington, D. C., Jan. 11, 1947.

the exercise of discipline over the rank and file, the encouragement of efficient performance, etc., but the most prevalent relates to the "employment effect" of the wage bargain.   Polar terminology is frequently employed; a "farsighted," "industry-minded," "mature," and "statesmanlike" labor leader is one who gives a proper measure of consideration to the "employment effect."   The most common criticism of labor leaders is their "shortsightedness": they ignore the long-run elasticity of demand; the highest praise is reserved for those who, like the presidents of the Iron Molders, the Hosiery workers and the Photoengravers, have cautioned their members against "pricing themselves out of the market."

At the outer fringe of economics where special pleading is carried on, pointed contrasts are often made between the beneficent results of free pricing and the malevolent consequences of collective bargaining, on the assumption that free pricing would exist in the absence of labor unions.[3] Specious comparisons of this kind, although respectable 20 years ago, are seldom encountered within the pale today.   Contemporary economic theorists content themselves with stern warnings concerning the danger of unemployment.   According to Bowman and Bach (following Hicks), wages can be raised above the competitive equilibrium level "only at the cost of some unemployment of previously employed workers, or in periods of expansion, at the cost of a smaller increase in employment than would otherwise occur."[4] Berman expresses the almost universal judgment that "the unions in the building industry, by trying to maintain high wage levels, were probably influential in intensifying the depression in building, and thus bringing about unemployment and decreased incomes for their members."[5] Nourse states that "if wages are forced up beyond the point where the increase can be paid from profits without impairing the solvency of the company or its ability to finance further technological improvements, the wage increase must be reflected in an increase in the price of the product.   This, in all but exceptional cases, must mean a decline in the volume of sales and the amount of employment."[6]

From emphasizing the dangers involved in collective wage determination it is only a short step to reason that trade union leaders should avoid these dangers and preserve the employment opportunities of the workers they represent.   As noted above, this is the most popular concept of union responsibility.   Most union leaders are anxious to behave in a business-like fashion and are willing to join in general pronouncements concerning their responsibility for employment. For example, the Labor Committee of the Twentieth Century Fund, which included Robert J. Watt of the AFL and Clinton Golden of the CIO, stated that "both management and union must be aware of the danger of 'pricing themselves and their product out of the market.'   In this connection, collective bargaining becomes a crucial instrument for sparking and stimulating the capacity use of

[3] See Introduction by Leonard H. Read in *Wages and Prices;* and Hastings Lyon, *Dictatorship of the Proletariat in the United States.*

[4] M. T. Bowman and G. L. Bach, *Economic Analysis and Public Policy*, p. 471.

[5] Edward Berman in *Economic Problems in a Changing World*, W. L. Thorp, ed., p. 315.

[6] E. G. Nourse, *Price Making in a Democracy*, p. 273.

our materials, our machines, our man power. This function is especially important in view of the fact that the basic decisions of our time are group decisions, and not the solitary decisions of individual sellers and individual buyers. . . . Price and wage administration today must move toward the same goal as that achieved by the automatic competition of the free (or nearly free) market. . . ."[7]

This makes a fine text. No one could question these worthy sentiments. But how much help are they as a guide to the negotiation of individual agreements? The central argument of this paper is that they are no help at all.

There are two major reasons why it is usually impossible in specific cases to assume responsibility for the employment effect. The first is that the typical wage bargain in the United States covers only a minor fragment of the economy. Therefore, analysis of the employment effect must be conducted on a particular equilibrium basis. The impact on aggregate consumer spending is not sizable; demand for the commodity must be regarded as given; wages affect labor demand only through the cost-price relationship. This type of analysis is appropriate to the situation, but the difficulty is that when the problem is approached in this fashion, the answer is invariably the same: the best wage (from the standpoint of employment) is the lowest wage. When Hazlitt argues that "the best wages are not the highest wages, but the wages that lead to full employment,"[8] he establishes a valuable criterion for wage movements in the economy at large. But when the criterion is applied, as it is so often, to isolated wage bargains covering small pieces of the economy, where considerations of cost are paramount and income irrevelant, then it yields only one answer and loses all utility as a tool for distinguishing right and wrong. "The situation for labor is comparable to that found in connection with any product. The higher the price, the smaller the demand in a given set of circumstances; the lower the price, the greater will be the demand."[9] No matter how well-intentioned, statements of this kind throw the weight of academic authority on the side of the employer. The unions retaliate by hiring their own economists to demonstrate the necessity of mass purchasing power, and the net result is that economic analysis has virtually no serious influence in the making of the wage bargain.

But the line of reasoning has another weakness which is even more fundamental. It assumes that union leaders are in a position to consider the employment effect of their decisions, if they would. When Mr. Taylor states that "the labor cost consequences of many proposed wage policies and the effect of these policies upon the relative competitive positions of business enterprises have frequently been ignored,"[10] he clearly implies that they need not have been ignored and perhaps that they should not. Thus, it is conceived that the employment effect of the wage bargain is the subject of rational calculation

[7] Twentieth Century Fund, *Trends in Collective Bargaining*, pp. 230–31.

[8] Henry Hazlitt, "Wages and Prices," in *Proceedings of the Academy of Political Science*, May 1946, p. 27.

[9] Jules Bachman in *Wages and Prices, op. cit.*, p. 50.

[10] George W. Taylor, "Wages and Industrial Progress," address delivered at University of Pennsylvania, Jan. 10, 1947.

in the bargaining process; or, at any rate, that it can be.   There would be no point in assigning responsibilities unless it were felt that decision-making officials are in a position to carry them out.

If the employment effect of the wage bargain is to be the subject of rational calculation, it has to be predictable.   There needs to be a reasonably exact relationship between wage rate and volume of employment before the fact, at the time the bargain is made.   But this is possible only if other things remain equal.   There must be no other and more powerful influences affecting the volume of employment; or if there are, then they must be predictable in their effects.

Here, as elsewhere, other things do not remain equal.   The wage bargain looks forward, not backward.   Even if wage rates are connected with employment at one point of time, over any substantial period of time there are such pronounced changes in productivity, consumer preferences and the general condition of business that the relationship is fatally beclouded.   In other words, production coefficients, substitution functions, and aggregate demand do not remain constant.   As a result, the employment effect is buried beneath weightier influences. The volume of employment associated with a given wage rate is unpredictable before the fact and the effect of a given rate upon employment is undecipherable after the fact.   The employment effect cannot normally be the subject of rational calculation and prediction at the time the bargain is made; and union officials are normally in no position to assume responsibility for it.   It is the exceptional case which is so widely celebrated in the literature of labor economics as a model of responsible behavior which all unions could do well to emulate.

To be sure, the employment effect is *conceptually* measurable in formal economic theory; abstracting from external influences is legitimate enough in a theoretical analysis of wage-price-employment relationships.   But we are not concerned here with how these matters appear to the economist, but with how they appear to union and management officials.

<center>II</center>

The chain of logic connecting the rate of wages with the demand for labor in the individual firm has four links.   The wage rate is related to the labor cost of production; labor cost is an important element of total cost; total cost affects the price of the product; the price determines the amount to be sold and therefore the amount of labor to be hired in producing it.   Under the classical assumptions (constant production functions, consumer preferences and aggregate demand, and competitive product pricing), impulses would be transmitted reliably from one end to the other; a given change in wages would have a unique and predictable effect upon employment.   In actual fact, however, there is a great deal of free play at each link in the chain.

a. *Wage rates and labor cost.*   In the first place, there is no assurance that a given change in wages will lead to a corresponding change in labor cost, or to any predictable change whatever.   In order to demonstrate this statement, it is necessary to deal with statistics on average hourly earnings; these are not the same as wage rates, of course, but they are used because of the scarcity of wage

rate information. Table I shows indexes of average hourly earnings and unit labor cost in 19 manufacturing industries, covering the period 1929–1940. For most of the industries, movement in the two indexes are extremely divergent, and increasingly so with the passage of time. For example, average hourly earnings in petroleum refining increased by one-half over the 11-year period, while labor cost fell by one-quarter. The index of average hourly earnings in rayon rose to 147.5, while the index of labor cost dropped to 37.3.

As Table I is constructed, the divergencies are cumulative. It might be argued on various grounds that only year-to-year changes are important for the present purpose; if a reasonably consistent short-run association between movements of earnings and labor cost could be established, it might be sufficient. Table II shows year-to-year percentage changes in average hourly earnings and labor cost for the 19 industries included in Table I. It is evident that the association is not at all consistent. Hourly earnings and labor cost have frequently moved in opposite directions. This was true during eight years out of ten in the rayon industry; during six years in the newspaper and periodical industry; during five years in the agricultural implement, lumber and timber, and petroleum refining industries; and during three years in the boot and shoe, chemical, meat-packing, and cigarette industries.

An important study of wage rates, labor costs, and hourly earnings in four industries, published as a monograph of the Temporary National Economic Committee in 1940, reached a similar conclusion. "Just as changes in wage rates do not necessarily result in corresponding changes in average hourly earnings, so the relation between wage rates and labor cost is by no means direct. The records of the companies included in this study clearly indicate that it would be erroneous to assume that an increase of, say, 10 per cent in wage rates is necessarily accompanied by an increase of 10 per cent in labor costs, or that a 10 per cent cut in wage rates is always followed by a 10 per cent drop in labor costs. Many factors beside wage rates influence labor cost. The relation between changes in wage rates and labor costs is somewhat closer where workers are paid by the piece than where they are paid by the hour, but even in the former case the trends of wage rates and labor costs are not necessarily parallel."[11]

The basic reason for the lack of correspondence is that unit labor cost depends not only on hourly earnings but also on productivity, or output per man-hour.[12] Changes in productivity are the result of two causes: (1) changes in technology, organization, and human efficiency; and (2) changes in the intensity of labor utilization. In the long run, changes in technology, organization, and relative

[11] *Industrial Wage Rates, Labor Costs and Price Policies*, Monograph No. 5, Temporary National Economic Committee, Washington, 1940, p. xix.

[12] "Output per man-hour, together with average hourly earnings, determines . . . unit labor cost. . . . Unit labor cost varies directly with average hourly earnings and inversely with output per man-hour. If output per man-hour is advancing, unit labor cost will decline unless there are increases in average hourly earnings larger than the gains in output per man-hour. Conversely, if average hourly earnings increase, unit labor cost will also rise unless the increase in average hourly earnings is over-balanced by gains in output per man-hour." ("Productivity Changes since 1939," *Monthly Labor Review*, Dec. 1946, p. 914.)

factor prices are the most important determinants; but from year to year, fluctuations in the volume of output are often of greatest significance. Thus, Hirsch notes a distinction between "volume productivity" and "real productivity."

TABLE I

Indexes of average hourly earnings and unit labor cost, 19 manufacturing industries, 1929–1940
(1929 = 100)

YEAR	AGRIC. IMPLEMENTS		BOOTS AND SHOES		CEMENT		CHEMICALS		COTTON GOODS		FLOUR ETC.		FURNITURE		GLASS GROUP		IRON AND STEEL	
	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC
1929	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1930	102	86	96	99	99	95	100	100	100	104	98	93	99	101	104	101	103	109
1931	108	128	83	87	101	84	102	90	87	92	93	84	93	97	107	88	93	102
1932	102	n.a.	75	73	83	71	95	80	74	72	83	77	80	83	98	78	90	94
1933	91	235	77	68	90	76	94	78	86	78	85	79	75	81	97	67	87	85
1934	104	—	92	80	110	91	103	98	117	101	98	91	87	85	109	81	104	102
1935	97	110	94	75	108	96	106	91	116	93	99	94	84	83	115	73	106	98
1936	106	83	92	69	105	82	111	90	114	83	94	93	84	87	120	78	105	94
1937	131	108	96	78	126	101	128	101	127	93	98	102	93	95	133	80	127	112
1938	129	72	94	74	127	99	134	108	122	89	99	93	95	91	137	91	130	112
1939	118	77	92	72	125	89	134	97	120	82	103	89	94	88	138	76	130	95
1940	124	77	96	71	123	89	141	106	127	82	104	90	97	89	142	77	130	98

YEAR	LEATHER GROUP		LUMBER AND TIMBER		MOTOR VEHICLES		NEWSP. AND PERIOD.		PETROL. REFIN.		RAYON		TIRES AND TUBES		MEAT PACKING		CIGARETTES		WOOLEN AND WORSTED	
	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC
1929	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1930	102	102	99	104	96	90	99	103	103	107	115	91	103	90	101	98	90	85	104	103
1931	98	101	89	81	95	100	99	101	106	91	99	66	99	69	96	85	83	77	98	89
1932	90	83	70	72	96	116	91	95	102	83	85	55	90	58	82	72	77	69	85	73
1933	91	81	73	70	84	85	86	89	106	79	91	46	93	61	83	71	90	73	88	72
1934	107	86	91	84	104	103	96	87	118	87	111	54	112	71	99	96	83	82	112	84
1935	110	86	88	80	108	92	101	85	126	85	114	51	121	71	105	102	96	85	109	78
1936	111	87	84	82	113	93	102	84	129	82	115	48	125	72	103	95	110	85	111	81
1937	120	92	90	90	125	105	101	84	148	88	132	51	137	78	118	112	119	94	126	92
1938	120	85	92	87	129	109	104	86	153	86	138	48	136	75	121	102	119	97	119	94
1939	120	79	99	82	130	110	106	82	149	77	141	43	137	69	120	95	121	95	115	81
1940	122	80	106	82	133	111	108	80	150	75	148	39	138	68	121	94	128	98	122	89

Source: Bureau of Labor Statistics, *Productivity and Unit Labor Cost in Selected Manufacturing Industries, 1919–1940*, Feb. 1942. Indexes of unit labor cost are included in this report. Indexes of average hourly earnings were computed by dividing indexes of manhours into indexes of payrolls.

"We must try to distinguish as sharply as possible between increase and decrease of productivity caused by larger or smaller output volume—volume productivity increase—and the increase and decrease of productivity caused by real improvement of production or organization—real productivity increase. . . . The trends

TABLE II

Year-to-year percent change in average hourly earnings and unit labor costs, 19 manufacturing industries, 1929-40.

YEAR	AGRIC. IMPLEMENTS		BOOTS AND SHOES		CEMENT		CHEMICALS		COTTON GOODS		FLOUR, ETC.		FURNITURE		GLASS GROUP		IRON AND STEEL		LEATHER GOODS	
	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC
1929-30	+2	-14	-4	-1	-1	-5	0	-1	0	+4	-2	-7	-2	+1	+4	+1	+3	+9	+2	+2
1930-31	-6	+49	-14	-11	+2	-11	+1	-9	-14	-11	-5	-10	-6	-4	+3	-13	-9	-6	-4	-1
1931-32	-	-	-9	-16	-18	-15	-6	-11	-15	-22	-11	-8	-14	-14	-9	-11	-3	-7	-8	-17
1932-33	-15	+84	+3	-8	+8	+7	-3	-3	+16	+9	+3	+3	-7	-2	-1	-14	-4	-10	+2	-3
1933-34	+6	-	+20	+17	+22	+20	+10	+25	+36	+29	+15	+16	+15	+5	+13	+21	+19	+21	+17	+7
1934-35	+2	-53	+2	-6	-1	+5	+3	-7	-1	-8	+1	+3	-4	-3	+5	-11	+2	-5	+3	+7
1935-36	+9	-25	-2	-8	-3	-15	+4	-1	+2	-11	-5	-2	+1	+5	+4	+7	-1	-4	+1	+1
1936-37	+24	+30	+5	+13	+20	+24	+16	+12	+12	+12	+5	+10	+11	+10	+10	+3	+21	+19	+8	+6
1937-38	-2	-33	-2	-5	0	-3	0	+7	-4	-4	+1	-8	+2	-4	+3	+14	+2	0	0	-8
1938-39	-9	+7	-2	-3	-1	-9	0	-10	-2	-8	+3	-4	-2	-3	-1	-16	0	-15	0	-7
1939-40	+5	0	+4	-1	-1	0	+5	+10	+6	-1	+1	+1	+4	+1	+3	+2		+2	+2	+2

YEAR	LUMBER AND TIMBER		MOTOR VEHICLES		NEWSP. AND PERIOD.		PETROL. REFIN.		RAYON		TIRES AND TUBES		MEAT PACKING		CIGARETTES		WOOLEN AND WORSTED	
	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC	AHE	ULC
1929-30	-1	+4	-4	-10	-1	+3	+3	+7	+5	-9	+3	-10	+1	-2	-10	-15	+4	+4
1930-31	-10	-22	-1	+11	0	-2	+4	+15	+14	-28	-4	-23	-5	-13	-8	-10	-6	-14
1931-32	-21	-11	+1	+16	-8	-7	-4	-10	-13	-16	-9	-16	-15	-15	-7	-10	-14	-18
1932-33	+4	-3	-12	-27	-5	-6	+3	-4	+7	-18	+3	+5	+2	-1	+17	+6	+4	-1
1933-34	+25	+20	+24	+22	+12	-2	+11	+11	+22	+19	+20	+16	+20	+34	-8	+11	+28	+16
1934-35	-3	-5	+4	-11	+5	-3	+7	-2	+3	-6	+9	0	+7	+6	+16	+5	-3	-7
1935-36	-5	+2	+4	+1	+1	-1	+3	-4	+1	-6	+4	+1	+2	-7	+15	-1	+2	+4
1936-37	+7	+10	+12	+13	-1	0	+15	+8	+15	+5	+9	+9	+15	+18	+7	+11	+13	+15
1937-38	+3	-3	+3	+4	+2	+3	+3	+3	+5	-5	0	-4	+2	-9	+1	+3	-5	+1
1938-39	+8	-6	+1	+1	+2	-5	-2	-10	+2	-11	0	-8	-1	-7	+1	-2	-4	-13
1939-40	+6	0	+2	+1	+3	-2	+1	-3	+5	-8	+1	-2	0	-1	+5	+3	+6	+9

Source: Computed from Table I.

in volume productivity are practically a direct consequence of the law of fixed costs. As business volume rises, the unit costs decrease automatically, within certain limits; with decreasing business volume they rise automatically.... This is not so with the real productivity increase caused by progress in technique and/or in business organization. In many industries, this progress is especially accelerated in times of business recession."[13]

The important point is that the impact of these changes over a future period is largely unpredictable. Even if all technological changes to be made during the forthcoming year were known, and even if the employer should present this information to the union in the collective bargaining conference, it would be very difficult to prophesy the anticipated labor cost. The future volume of output is even more speculative. The employer may have production plans, and conceivably may reveal them to the union; but they are obviously tentative. The actual volume of output over the next year will depend upon factors which are not within the orbit of decision and are not known when the wage bargain is made: the price and output policy of other employers, possible shifts in consumer demand, and the general condition of business. The last factor is clearly the most inscrutable of all. Neither economists nor businessmen have shown much ability to predict the course of the business cycle, and there is no compelling reason why labor leaders should be expected to do any better. It would be improper to criticize economic theory because of the difficulty of business forecasting; but it seems eminently proper to criticize illegitimate applications of economic theory to situations it is poorly equipped to handle.

b. *Labor cost and total cost.* Let us now examine the relationship between unit labor cost and total cost of production. The first point to be noted is that labor cost is usually a minor proportion of total cost for a single establishment or industry. Table III shows the wage bill as a percentage of the value of product for a comprehensive listing of 20 major manufacturing groups and 12 nonmanufac-

[13] Julius Hirsch, "Productivity in War and Peace," *American Economic Review*, May 1947 (Supplement), pp. 401–03. Economists have frequently observed that there is a large measure of overhead cost in wage payments. This observation is corroborated by studies of labor cost in specific establishments. "During the years of declining volume from 1929–33, (at the International Harvester Company), unit labor costs fell less rapidly than wage rates, largely because when volume is small the company cannot use efficiently the senior, more highly skilled and hence better paid employees whom it retains on its rolls. Moreover, when smaller runs of a given machine or size are being produced, there is an increase in the cost of preparation and of shifting over from one model to another, and the productivity of labor is correspondingly decreased. From 1933 to 1937, on the other hand, a rapid expansion of output was accompanied by a smaller increase in labor costs than in wage rates. Technological changes and an increase in operating efficiency at high levels of output were largely responsible." In a shoe company, "there were . . . substantial fluctuations in labor costs which were not associated with general changes in wage rates. For the most part these movements were due to the varying intensity with which services of employees paid by the hour were utilized, as a result of changes in the volume of production." And in the paper industry, "both technological improvements and fluctuations in the volume of output had significant effects on the unit labor costs of Companies A and B." (TNEC, *op. cit.*, pp. xix, xx).

turing industries in 1939, as reported in the Census of Manufacturers and Census of Business.

A more detailed analysis of 90 manufacturing industries has been made by the Federal Trade Commission.[14]   Labor cost amounted to less than 15 per cent of the sales dollar in 27 industries; between 15 and 20 per cent in 17 industries; between 20 and 25 per cent in 25 industries; and more than 25 per cent in 21 industries.

Moreover, the total wage bill of a given industry may be affected by wage rates which are negotiated with a number of separate unions.   This is the familiar joint-demand situation.   Wages amount to 33.1 per cent of the value of product in the building construction industry, but it has often been observed that no

TABLE III
Labor cost as a percentage of value of product, 1939

A.   Manufacturing Groups

Tobacco Manufactures	5.2	Apparel and Related Products	19.7
Petroleum and Coal Products	5.9	Iron and Steel and Products	19.9
Food and Kindred Products	8.6	Leather and Leather Products	21.2
Chemicals and Allied Products	9.5	Furniture and Finished Lumber	
Nonferrous Metals	11.6	Products	21.7
Paper and Allied Products	15.3	Misc. Industries	22.9
Autos and Auto Equipment	16.0	Stone, Clay, Glass Products	22.9
Rubber Products	17.9	Machinery (except Electrical)	23.0
Printing and Publishing	19.1	Textile Mill Products	23.1
Electrical Machinery	19.4	Transportation Equipment	27.1
		Lumber and Timber Basic Products	27.7

B. Nonmanufacturing Industries

Wholesale Trade	4.7	Heavy Construction	32.8
Retail Trade	10.8	Building Construction	33.1
Crude Petroleum and Natural Gas	11.3	Railroads	46.6
Automobile Repair	19.1	Power Laundries	51.5
Metal Mining	24.3	Pennsylvania Anthracite	56.6
Highway Construction	29.1	Bituminous Coal	59.2

Sources: Census of Manufactures and Census of Business, 1939.

single craft accounts for much of this.   Newspaper publishers negotiate separately with the printing trades, the Newspaper Guild, the Building Service Workers, and the Teamsters.   The Standard Oil Company is reputed to deal with more than 20 different unions.   As collective bargaining is currently constituted, no single union is in a position to assume responsibility for what the others do, because it cannot control or predict the behavior of the others.   The Electrical Workers cannot hold down the wage rates of carpenters by withholding a wage demand on their own behalf.   In bargaining with newspaper

[14] Federal Trade Commission, *Industrial Corporation Reports, Summary 1940 Series*, 1943, pp. 27-28.   Labor cost is defined as including direct and indirect labor in the "production" expense classification, but not under other classifications such as research, selling, and general office.

publishers, or an association of publishers, the Teamsters will not be materially influenced by the wage policy of the Building Service Workers. Particularism in wage policy is the inevitable result of a fractionalized bargaining structure. To expect one organization to ignore its own particular interest by "setting a good example" for the others is a delusive hope, when there is no assurance that the example will be followed. Responsibility requires authority.

It may be objected that statistics on labor cost as a percentage of total cost, industry by industry, give a very misleading impression of the real importance of labor cost in the economy. It is true that wages and salaries make up about 70 per cent of income payments in the economy as a whole, but this is not relevant here. Wages are not determined for the economy as a whole, but for particular bargaining units. We must look at costs of production as they appear in these units. Total cost of production consists of three major elements— labor, materials, and overhead—and in most industries, labor is the smallest of the three. The more particularized is the system of bargaining units, the more is this true.

Economists have often remarked that fractionalized bargaining structure creates an illusion of inelastic demand for labor by breaking up total labor cost into a multitude of segments. This understates the problem; from the standpoint of each individual segment, the demand for labor *is* inelastic. As pointed out above, there is little profit in exhorting one segment to establish its wage policy in the light of the elasticity of demand for labor over some larger area.

There is profit in discussing wage policy for the economy as a whole, or a major segment thereof, but as yet there is no bargaining mechanism to which such a discussion can be addressed. A national wage policy would require a national wage bargain or some other kind of central determination. Moreover, when we deal with economic aggregates, the frame of reference must be broadened; wages must be seen not only as cost but as income. The concept of elasticity of demand for labor is not very helpful in this context. Conversely, considerations of full employment, inflation, deflation, etc., are not very helpful in individual bargaining disputes; arguments concerning over-all economic welfare have little weight in collective bargaining and are properly given little attention by labor arbitrators.

Not only is labor cost a minor fraction of total cost in most industries, but there is very little correspondence in their movements. This is particularly evident during a period of rapidly changing business activity. In a depression, for example, the employer may succeed in reducing labor cost through a cut in wage rates, and in securing raw materials more cheaply; but the increase in overhead cost per unit may wipe out any reduction in direct expenses. Conversely, labor cost and raw material cost may advance during a recovery, but the higher volume of production may reduce unit overhead cost to such an extent that the total expenses of production are lower. As the TNEC states, "It is this inverse relationship between trends in direct labor-and-materials costs and in unit-overhead costs which renders the relation between changes in labor costs and in total costs almost unpredictable."[15]

[15] TNEC, *op. cit.*, p. xxi.

c. *Total cost and selling price.*

d. *Selling price and volume of employment.* We come now to the last two links in the chain. No extended argument should be needed to remind the reader that there is a great deal of indeterminateness in both cases. To analyze the looseness of the connection between cost of production and selling price on the theoretical level would require us to canvass a large and generally familiar body of doctrine on imperfect competition; and to describe it on the empirical level would require us to summarize at least a score of recent investigations of price policy. Certainly there can be no disagreement that many employers are in a position to pursue a price policy largely independent of fluctuations in cost over considerable periods of time, and do in fact pursue such a policy. Employers commonly emphasize the cost-price relationship as a debating point in collective bargaining, but it has been fittingly observed that ". . . businessmen tend to overstress the importance of costs in relation to their decisions on prices. . . . The only generalization possible is that costs have an obvious influence upon prices, and prices in turn upon costs; the character of the relation in any individual case and at any specific time must be individually appraised on the basis of all the attendent conditions. Needless to say, this leaves the effect of wage rate changes on prices even more indirect and remote."[16]

Finally there is the employer's labor demand or the volume of employment in the enterprise. It goes without saying that a policy of price rigidity, which is so frequently encountered, breaks the chain altogether at this vital point. As Lester remarks, "Where employers follow rather rigid price policies, each employer's rate of operations and demand for labor will be largely determined by the general state of trade, and his total employment may have no close and direct relationship to changes in wage rates."[17]

But even in the absence of price rigidity, the effect of price upon employment is quite unpredictable. A great deal depends upon the price and output policies of other employers, and the wage policies of other unions, none of which are within the orbit of control. Even if these were known in advance, the crucial question would be left unanswered. This, of course, is the future trend of business activity and consumer demand. The union and employer representatives who participate in collective bargaining are as ignorant of the future trend of business activity as are the stock-market forecasters. This may be one reason why "wage structures are bargained for in an essentially non-cyclical time setting."[18]

Thus, there are four links in the chain between wage rates and employment. At each juncture, there is a great deal of free play; and as a result, the initial and final links are so loosely connected that for practical purposes they must be regarded as largely independent. The uncertainty and indeterminateness

[16] TNEC, *op. cit.*, pp. xxiv–xxv.

[17] R. A. Lester, *Economics of Labor*, p. 121.

[18] J. T. Dunlop, *Wage Determination under Trade Unions*, p. 68. Dunlop notes that "the basic wage rate is regarded as a long-run price, usually set with an eye to non-cyclical circumstances." However, his explanation of this fact suffers from the highly artificial assumption that the union endeavors to maximize the total wage bill of the firm.

encountered at each individual state are multiplied in geometric form throughout the progression.

Therefore, when we assume that trade unions have a "wage-employment policy," we encompass a group of relationships which are bound together by insufficient and indeterminate causes. In a logical exercise we can abstract from external influences, so that the relationships appear rigorous and precise; but the external influences are so obtrusive in reality that they dominate the scene. Policy must address itself to reality. In the normal case the wage bargain is *not* a wage-employment bargain in the minds of the negotiators.

A number of objections might be made against the foregoing argument. It might be contended that the relationships are loose in the short run but more precise in the long run. Trade union leaders are frequently criticized for ignoring the long-run effect of their policies. But we should not confuse the conceptual long run of equilibrium theory with the chronological passage of time. In the *conceptual* long run, under "normal price" analysis, the relationship between cost and price becomes tighter than in the short run. However, in the *chronological* long run the line of connection between the wage rate and the volume of employment becomes less rather than more determinate. The more time passes, the greater are the changes in production and consumption functions and in other data which are regarded as given in equilibrium analysis. Twenty years from now, we will presumably have a bituminous coal industry of some size. Who will be able to say how much larger or smaller would have been the total employment in the industry in 1967 if the wage rate established by the Lewis-Fairless agreement back in 1947 had been 10 cents lower or 10 cents higher?

It may also be objected that all of this is somewhat beside the point. Even though the line of connection between the wage rate and the volume of employment is extremely loose, we are certain of one thing: employment in the firm or the industry will not be greater with a higher rate than with a lower rate, and may conceivably be less. Therefore a moderate wage policy is more responsible than an aggressive policy. This objection does have a certain formal validity, but it logically implies that the lower the wage, the more responsible is the union. No economist would make such a statement and no union leader would find it helpful. Moreover, the objection is fatally obtuse from a political standpoint. It is very difficult for a union official to forego a wage increase or consent to a wage cut, or to recommend to his constituents that they do so. Union leaders rarely lose their jobs for being too militant, but often for being too conciliatory. When an official makes an unpopular decision, there must be a reasonable probability that the presumed benefit will actually materialize. If a 10 per cent wage cut may be associated with anything from a 50 per cent increase to a 50 per cent decrease in employment, the range of error is too great. He cannot afford to take the chance.

Finally, attention may be called to certain cases of responsible union behavior which are so generously praised in the literature of labor economics. But these cases are exceptional and not normal. For example, there is the oft-told tale

of the labor-management cooperation in the clothing industry. The case of the Clothing Workers was exceptional because the wage-cost-price-employment relationships were relatively clear and predictable. Under the piece-rate method of compensation, wage rates were closely linked with unit labor costs. Labor cost was a fairly substantial proportion of total cost; moreover, at the same time as wages were cut, the employers agreed to take other measures to reduce overhead and material costs. Because of the competitiveness of the industry, selling prices were closely related to total costs. And inasmuch as the essential problem was one of meeting nonunion competition in the same industry, the volume of sales of union employers, and the volume of employment in their establishments, were clearly affected by their selling prices. (We may note, incidentally, that the Clothing Workers abandoned the policy in 1939 in favor of a policy designed to equalize labor cost throughout all markets.)

A similar incident which is often displayed as a model of responsible behavior is the action of the Hosiery Workers, who voluntarily accepted a wage cut in order to permit union employers to modernize their plants. Here again we must note the presence of piece rates, the prominence of nonunion competition, and the employers' agreement to take other steps of a cost-reducing nature.

But the typical case has little in common with these. Let us assume that a collective bargaining conference is held at some point during the course of a depression. The union leader is asked to accept a 15 per cent wage cut in order to avert a decrease in plant employment. He has no assurance that unit labor cost will decline 15 per cent. In any event, this would amount to only 3 per cent of total unit cost (assuming that labor cost is 20 per cent of total cost in the industry). Overhead cost per unit may increase to such an extent as to wipe out this small gain. But even if total unit cost should fall and even if the employer should reduce his selling price correspondingly in order to improve his competitive position, the wage cut may be diffused throughout the industry, thus dissipating the employer's competitive advantage. If wage cuts become general throughout the economy, then purchasing power suffers.[19]

There are additional difficulties as well. The employer is reluctant to reveal confidential data concerning his financial position. The union suspects he is exaggerating, as he probably is. The union's research staff has supplied information indicating that the cost of living will advance during the next six months. The employed members of the organization, who are still in the majority, are not enthusiastic over the prospect of lower incomes. The union leader fears that it will be difficult to recover any concession which may be granted at the present time. Moreover, he knows that he will suffer politically if he accepts or recommends a wage cut which does not lead to the predicted results. In view of the fact that the connection between the prospective wage rate and the prospective

[19] The Keynesians were not the first to be skeptical about wage reductions as a remedy for unemployment. A careful study of union wage policy in the 1920–22 depression concludes that "in spite of the concessions made by the unions there was no subsequent marked improvement in the conditions of the trades which could be directly attributed to the concessions." (V. J. Wyckoff, *The Wage Policies of Labor Organizations in a Period of Industrial Depression*, p. 108).

volume of employment is quite inscrutable, he can hardly wish to take the chance. If he does assent to a cut, it is not out of any substantial hope that employment in the trade will be increased, but only in the interest of keeping the peace with the employer and maintaining the bargaining relationship.[20]

Although economic considerations are approached with great solemnity and argued with a fine show of confidence, they are not conclusive in making of the bargain. The employment effect becomes a symbol in the service of partisan debate, and not a useful test of policy.

III

There are additional difficulties in applying the theory of the individual firm toward an analysis of particular wage bargains. These result from the tautological character of marginal concepts according to the latest authoritative formulation.

The reader may already have been reminded of the recent controversy between Mr. Lester and Mr. Machlup over the marginal productivity principle.[21] The present author would not presume to make a final judgment upon the controversy, but it is quite relevant here. The central issue was whether the employer actually adjusts his operations to a change in wage rates in the manner postulated by the theory of the individual firm. In reply to Lester's criticisms, Machlup made a restatement of the theory in which "the concepts are to be understood as referring to subjective estimates and conjectures. . . . The time range of the relevant anticipations will depend on the circumstances of each case and will rarely be confined to the short run. . . . The estimates need not be reduced to definite numerical values. . . . Non-pecuniary considerations may effectively compete with those pertaining to the maximization of money profits."[22] Moreover, "an increase in wage rates may have very different effects depending on whether the employer (1) (a) has foreseen it, (b) is surprised by it; (2) (a) reacts quickly to it, (b) reacts slowly to it; (3) (a) expects it to be reversed soon, (b) expects it to be maintained, (c) expects it to be followed by further increases; (4) (a) assumes it to be confined to his firm, (b) assumes it to affect also his competitors, (c) believes it to be part of a nation-wide trend; (5) connects it with an inflationary development; or is influenced by any other sort and number of anticipations. Most of these moods and anticipations can be translated by the economists into certain shapes or shifts of the marginal productivity functions of the firms. . . ."[23]

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[20] In a recent conversation with a labor leader, the author asked what would happen to the wage schedule in the event of a depression. He replied, "I hope our members will have sense enough to take a cut. Our kind of labor isn't particularly scarce. The employers can break the union if they get mad enough."

[21] R. A. Lester, "Shortcomings of Marginal Analysis for Wage-Employment Problems," *American Economic Review*, March 1946, pp. 63–82; Fritz Machlup, "Marginal Analysis and Economic Research," *American Economic Review*, Sept. 1946, pp. 519–54; and subsequent communications by both authors in the March 1947 number of the review.

[22] Machlup, *op. cit.*, p. 533.

[23] *Ibid.*, p. 548.

This is fine for the economist.   He makes an orderly retreat into the realm of the uncontestable, and rescues himself by strategic enlargement of definition. The system becomes so tautological that no businessman can possibly fail to equalize marginal net revenue product with marginal labor cost, just as no consumer can possibly fail to maximize satisfaction under the contemporary attenuated theory of marginal utility.   Any proposition can be automatically validated in this manner.

But surely this is fatal to the notion that marginal analysis can usefully be applied in an endeavor to achieve optimum results in practical decisions.   It may be argued that this is not for the economist to worry about; his primary concern is to protect the integrity of economic doctrine.   If so, then we should frankly state to the labor negotiator that economic analysis cannot help him substantially in establishing a responsible wage policy under the present fractionalized bargaining structure.

A tautological proposition is automatically valid if simple rules of logic are observed, but it has no real explanatory value.   Devoid of explanatory value, it is doubly lacking in predictive value.   What is the position of the responsible labor leader who would like to anticipate the employment effect of his bargaining demands?   He would have to predict the employer's adjustment to a change in wages.   If we can assume that Mr. Machlup has make an authoritative theoretical formulation of how the employer will adjust, then the union leader must predict the employer's "subjective estimates and conjectures" which "will rarely be confined to the short run," which "need not be reduced to definite numerical values," and which may be affected by "non-pecuniary considerations." Moreover, he must know whether the employer "(1) (a) has foreseen it, (1) (b) is surprised by it," etc., etc.; and finally "whether he is influenced by any other sort and number of anticipations"!

The psychological subtleties in which the theory of the individual firm have been enmeshed give rise to fascinating problems in second-degree horizons and vicarious anticipations.   But when added to the difficulties already described in the preceding section, they provide a conclusive demonstration that the wage bargain must almost always be made without consideration of its employment effect.

IV

If responsible wage policy under present bargaining structure cannot be defined with reference to its employment effect, then how may it be defined?

We must begin by describing the role of the trade union official.   He is the leader of a political instrumentality which has the same institutional drives as any political instrumentality: survival and growth.   To facilitate the survival and growth of the organization, and promote his personal advancement, he endeavors to reconcile the political pressures which are focused upon him in the bargaining process.   These pressures emanate from the rank and file, from the employers, from other levels of the organization, from other sectors of the labor movement and from the government.   They must somehow be resolved into a feasible compromise.   This is the job which he is called upon to perform.

The nature of the appropriate reconciliation depends upon the relative urgency of the pressures. The rank and file may be militant, inclined to strike, and receptive to the appeals of rival leaders; or it may be apathetic and safely loyal. The local union may be part of a highly centralized organization, governed by the policy of the international union; or it may be virtually autonomous. The employers may be well organized and determined to have their way; or they may be disorganized and anxious to avoid trouble. In the same way, other sectors of the labor movement and the agencies of government may or may not need to be reckoned with.

It has frequently been observed that in the absence of world government, sound international policy is a resolution of the national interests of the sovereign powers proportional to their strength and determination. By the same token, in a system of fractionalized bargaining units sound collective bargaining is a successful resolution of the political pressures which are focused on leadership in the bargaining process. A good bargain is one which provides a *modus operandi* and keeps the peace. It holds the rank-and-file in line. It discourages raiding on the part of rival unions. It satisfies the employer to such an extent that he is not inclined to make desperate attempts at union-smashing or to leave the industry altogether. It is compatible with the union's responsibility toward other levels of organization. It creates a measure of certainty and a basis of planning for a year or two ahead. It strengthens the fealty of the union toward the private-ownership system of production.

Such a definition of responsible wage policy may appear somewhat scandalous. But is it really so little? Imagine the consequences of a wage bargain which was not oriented to the reconciliation of political pressures. Imagine the rank-and-file revolts, the disorganizing jurisdictional raids, the bitter union-management conflicts involving the survival of one or another, and the incitement of anticapitalist agitation. The mobilization and education of a vast industrial labor force have already created severe problems of maintaining social stability. Would a nonpolitical wage bargain mitigate or aggravate these problems?

<p style="text-align:center">V</p>

The foregoing analysis may be summarized as follows:

(1) The most popular conception of responsible union wage policy is that it should give adequate consideration to the employment effect.

(2) Under contemporary bargaining structure, this is almost always an impossible requirement.

(3) Wage policy does have political responsibilities which are poorly appreciated but highly important for the maintenance of law and order in industrial life.

In view of this state of affairs, it may be inquired what can be done so that wage policy may become economically as well as politically responsible.

It is well to indicate at the outset the limits of possible reform. Union behavior will never satisfy the economist completely. A trade union is a political organization, and cannot be expected to address itself principally to the attain-

ment of economic objectives. Moreover, when the employment effect is approached on a particular equilibrium basis, the inevitable conclusion is that the lower the wage in the collective agreement, the more likely it is that employment will be higher in the firm. This is not helpful to the union.

However, it is possible to indicate certain conditions under which the employment effect of the wage bargain would be more predictable than at present, economic analysis more useful in the service of wage policy, and normative economic standards more compatible with the political requirements of a sound settlement.

Erratic fluctuations in business activity are clearly the most significant factor accounting for the indeterminateness of the wage bargain. Largely because of these fluctuations, wage rates and unit labor cost do not move together; unit labor cost and total unit cost frequently move in different directions; the effect of a change in cost upon price and the effect of a change in price upon employment cannot be foretold with any degree of confidence. Fluctuations in the general price level, which run concurrently with fluctuations in business activity, contribute in their own right toward the prevailing anarchy of the wage bargain. The assurance of stability in the volume of output and the level of prices would contribute more than anything else toward correcting this condition.

We have seen that the union as an organization and the union leader as an individual must adjust themselves to a group of political pressures. The more impelling are these pressures, the more difficult is it for the union leader to observe the canons of business morality. A secure union is better insulated from political pressures than an insecure union. Union security—defined broadly as security against the apathy of workers, the enmity of employers, the rivalry of competing unions, and the hostility of legislative bodies—is the sine qua non of responsible behavior. This is the point which Golden and Ruttenberg have argued so persuasively,[24] and with which most informed students of collective bargaining would readily agree.

But a responsible union is not enough. A responsible wage bargain is quite as important. A small bargain cannot be responsible. It cannot answer for its consequences, since they are lost in a sea of external forces. It cannot control the decisions of others, and it cannot afford to set an example. The particular interest of those immediately concerned is inevitably paramount; the general interest of the economy at large cannot be influential. What is needed is a wage bargain of sufficient magnitude to reflect the true significance of wages and salaries in the national income and permit the larger questions of economic policy to be considered.

Tendencies toward integration of bargaining structure are not difficult to perceive. Company-wide agreements are substituted for single-plant bargains; multiunion bargaining grows in popularity. As the orbit of comparison widens, patterns and precedents assume greater importance. We have now reached the stage of uniform industry-wide adjustment of wages in many of our major indus-

[24] Clinton S. Golden and Harold J. Ruttenberg, *The Dynamics of Industrial Democracy*, 1942.

tries, by virtue of formal bargaining organization in some cases and informal comparison in others.

But this is still a far cry from the master wage bargain which alone could assume responsibility for the volume of employment or other economic objectives. A master wage bargain, to which the government could not avoid becoming a party, is in many ways the antithesis of "free collective bargaining." Nevertheless we are driven ineluctably to agree with Slichter when he states, "The greatest possibilities of collective bargaining ... will probably not be achieved until representatives of labor as a whole and of business as a whole are able to fix the broad outlines of a national wage policy."[25]

To explore possible devices by which organized labor and organized business might fix the outlines of a national wage policy would take us beyond the scope of this article. We may note, however, that Beveridge came to a similar conclusion with respect to a full employment economy with strong and secure unions. He states that "in a full employment economy, great responsibility continues to rest with the trade unions and employers' associations—but a responsibility which transcends the compass of individual unions and industries and can be properly discharged only if every sectional wage bargain is considered in the light of the economy as a whole." He suggests that "the central organizations of labor ... should devote their attention to the problem of achieving a unified wage policy which ensures that the demands of individual unions will be judged with reference to the economic situation as a whole."[26]

An integrated wage policy for the United States seems quite remote at the present time. It may develop, however, when we resume the course toward mature industrial relations. Only then will negotiators be in a position to assume responsibility for the consequences of their decisions, and only then will economic analysis be of substantial assistance in discharging this responsibility.

[25] Sumner H. Slichter, "Labor After the War," in *Postwar Economic Problems*, p. 254.

[26] William H. Beveridge, *Full Employment in a Free Society*, (American edition), pp. 199-200.

ABSENCE OF ELASTICITY CONSIDERATIONS IN DEMAND TO THE FIRM*

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The conventional textbook explanations of entrepreneur behavior, based on marginalist assumptions, rest in part on presumed demand schedules facing each firm for each of its products. Such demand schedules are supposed to exist in some form in the mind of the firm's management and, thus, to influence price, production, and employment policy of the firm.

It is the contention of this note that the managements of many firms do not have or do not use the concept of subjective demand schedules for their products and that, therefore, it is not possible to apply to them the concepts of demand elasticity or of marginal revenue in the strict sense of those terms.[1]

Persistent, rigid conformity with the price leadership of another firm or other firms provides perhaps the most obvious illustration of the absence of subjective demand schedules for the individual firm.[2] Demand schedules may also be absent from the thinking of the management when it is assumed that the price of a product will remain unchanged for a considerable period of time.

I

A pattern of price leadership tends to prevail where manufacturers quote prices to their customers. For each class of product, one or more firms (often the largest suppliers of the product) serve as price leaders. Other manufacturers of the product, for various reasons, customarily and regularly follow the leader, adjusting their prices to correspond with the changes made by the leader or leaders, perhaps in some cases by maintaining a customary price differential where one has become established. Different firms may be the price leaders at different times or for different classes of articles in an industry.

Price followers do not establish and alter their prices according to presumed elasticities of demand to the firm for its products and assumed changes in such elasticities.[3] To the executives of such firms, demand does not appear as a horizontal line, as a sloped curve, or as a schedule with a "kink" or "corner"

[1] Throughout this note, the terms "demand elasticity" and "marginal revenue" have the customary meanings, referring to monetary quantities and excluding nonpecuniary psychological or institutional factors; the marginal revenue schedule is assumed to be derived from the demand schedule so that the absence of a demand schedule for a firm involves a corresponding absence of a schedule of marginal revenue.

[2] Consistent with such conformity may be the maintenance of a constant absolute or percentage differential in price between the price leader and the price satellite firm or firms.

[3] In answer to the question, "Then competition to your mind is following someone else's prices?" Mr. Dorenbusch, General Sales Manager of the Newport Rolling Mill Co. of Newport, Ky., replied: "Well, that is the system that is in effect." Hearings before the Temporary National Economic Committee, U. S. Congress, Part 27, *Iron and Steel Industry*, 1940, p. 14284.

at the prevailing price. The management of the firm often cannot sell all that it might like to produce at the prevailing price, yet it does not think in terms of how much more it might be able to sell by various reductions in price, for it accepts the price or prices established by the price leader.[4] Nor does the price follower think in terms of "imagined demand curves" for upward or downward movements in the prices of his various products, making allowance for probable price reactions of competing producers.[5] Consequently, interviews with executives of satellite firms in terms of traditional demand-curve analysis, or in terms of "imagined demand curves" that include allowances for rivals' price reactions, lead to negative results. Price followers simply do not think in those terms.

The absence of subjective demand schedules in the thought and decision-making process of price followers helps to explain why firms may operate at 50, 60, 70, or 80 per cent of capacity in an industry producing standard items like cotton or nylon gray goods (yarn, sheeting, broadcloth, women's hose, etc.), newsprint or wrapping papers, window glass, or cement, even though the individual firms are subject to decreasing variable costs per unit of output as the scale of their operations increases up to full (100 per cent) plant capacity.[6] It also helps to explain why variations in the cost schedules of a price satellite may have no effect, or no predictable effect, upon that firm's prices or production.

Under price leadership, the management of a price-conforming firm has no need to speculate regarding the character of the elasticity of demand to the firm for each of its products and regarding changes in such hypothetical demand elasticities. What the management of a price-following firm seems most concerned with are: (1) the probable total sales of all manufacturers of each item that the firm produces in the markets where it is or can be one of the suppliers and (2) the firm's competitive position in each of its manufacturing lines—its share of the totals in (1) distributed over time intervals.

A price follower adjusts his production and employment by deciding how best to allocate his manufacturing output between price and product lines, given the facilities and resources at his command and based on assumptions as to which prices are likely to rise or fall, which market is likely to expand or contract, where from the long-run point of view it would be advisable for him to maintain or improve his market position by such means as expenditures on advertising and product design. In other words, the management of a price-following firm tends to base its production and employment schedules upon the expected volume of orders and sales for each of its products at the prevailing prices established under price leadership, such sales being influenced perhaps by the firm's

[4] Secret price concessions may be a possible exception but are likely to be of no real importance unless such a practice is general, with price leaders also currently engaged in the practice so that it is no longer secret in the sense that it is confined to one firm or a few firms and unknown to the others.

[5] See Paul M. Sweezy, "Demand under Conditions of Oligopoly," *Journal of Political Economy*, Aug. 1939, pp. 568–573.

[6] See the author's paper, "Shortcomings of Marginal Analysis for Wage-Employment Problems," *American Economic Review*, March 1946, pp. 68–71, and also "Marginalism, Minimum Wages, and Labor Markets," *American Economic Review*, March 1947, pp. 138–141.

advertising, product engineering, reputation with customers, sales organization, and so forth.

This note will not discuss the various factors that cause followers to accept price leadership rather than to pursue independent price policies. The explanation may be business ethics, trade-association influences, habit, fear, lack of enterprise, cost-accounting methods, legislation, or some other circumstance. One may seek to include all such "institutional" and "psychological" factors within demand and marginal revenue schedules. To do so indiscriminately, however, would deprive such terms as "demand elasticity" and "marginal revenue" of much of their analytical value and would render them practically meaningless.[7] As previously indicated, the more generally accepted meanings of such terms are used in this note.

Also, no attempt will be made to explain here the relative importance of numerous factors that may influence price leaders in establishing and altering their prices under varied circumstances. Judging from conversations with managements of leading concerns, many of them seem to be motivated not only by the expected effects of their price activities upon their company's relative share of the total sales in each of its markets but also by the estimated effects of their prices upon the whole industry or branches of industries in which their company is operating. Price leaders often assert an interest in such matters as keeping the industry stable and prosperous, maintaining small firms in the industry, and avoiding substitution by rival commodities, so that the elasticity of aggregate demand for a particular article produced by a number of firms may often be more significant in the price policy of a price leader than hypothetical elasticities of demand facing the leader alone.

II

The prices of many items may remain absolutely fixed for long periods of time. The prices of certain iron and steel products (cast-iron pipe, wire nails, tin plate, and steel rails), aluminum, plate glass, chemicals (such as sulfuric acid, caustic soda, anhydrous ammonia, soda ash, and laundry starch), pharmaceutical products, tobacco products, and less popular books, have remained constant for many years with practically no change, if any, in the quality of the product. Other items like various articles of men's clothing, boxes of chocolates, Shick electric razors, and certain business machines, have sold year after year for the same price but often with some change in quality or ingredients over a five- or ten-year period. The same is true of low-priced items having a customary price such as 5-and-10-cent-store articles, newspapers and magazines, candy bars and gum, and some packaged foodstuffs.

Wherever interfirm competition is based primarily on quality changes rather than price changes, so that managements expect prices to remain unchanged

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[7] For a discussion of the disadvantages of attempting to broaden the definitions of marginal revenue and marginal cost to include nonpecuniary factors and other considerations, see Henry M. Oliver, Jr., "Marginal Theory and Business Behavior," *American Economic Review*, June 1947, pp. 375–78.

for long periods of time, company managements do not seem to think in terms of demand elasticities—the possible volume of company sales at different hypothetical prices for its products.[8] They are much more prone to think of the alterations in the volume of sales likely to accompany changes in the quality of product or in the amount of service offered to customers or in the volume of advertising expenditures.

If company executives have good reason to expect no change in the price or prices of their products for a considerable period of time, they have little need for current and continuing speculation concerning the nature of static demand and marginal-revenue schedules for each of the firm's products. Companies may continue to quote unchanged prices over a number of years for such reasons as a desire to avoid action that would draw attention to their prices, that would disrupt price understandings or arrangements, or that would stimulate a price war. They may hesitate to take price action that would cause offense to customers, would tend to increase fluctuations in the volume of their sales, or would result in loss of advertising values or in additional costs and administrative inconvenience to the company from changes in catalogues and price schedules.[9]

It might also be mentioned that companies quoting the same uniform delivered prices anywhere in the country[10] do not speculate about possible differences in elasticity of demand between market areas or localities and adjust their price, production, and employment policies according to local demand elasticities or changes in such elasticities. Furthermore, with uniform delivered prices or "freight allowed" price quotation, the seller cannot, strictly speaking, operate in terms of a marginal-receipts schedule, since his net receipts per unit of sales will vary with the geographic location of each buyer. Local retail outlets of large firms generally sell the firm's nationally advertised products at the same price regardless of local demand or cost conditions. Officials of the Teamsters' Union in the West have repeatedly pointed out that, despite the high wages for truck drivers, delivery men, and other union employees in, say, the city of Seattle, Washington, the prices of nationally advertised products delivered at one's home in Seattle are no higher than they are in other localities, such as the deep South, where wage rates and labor costs have been much lower and where, presumably, the elasticity of demand for various products is very different in view of marked differences in income levels, income distribution, consumer tastes, and competitive conditions.

III

If the foregoing discussion is valid, price-following firms and producers of articles with customary and constant prices do not frequently and seriously

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[8] There is need for study of the inherent difficulties of constructing static demand schedules under oligopoly or monopolistic competition.

[9] See J. K. Galbraith, "Reflections on Price Control," *Quarterly Journal of Economics*, Aug. 1946, pp. 481–84.

[10] Products that have customarily sold at uniform delivered prices throughout the country include branded items in such lines as men's suits and shirts, shoes, mattresses, rubber tires and tubes, electric fans, vacuum cleaners, and refrigerators, various cereals, some automobile parts, and items of hardware like small tools.

speculate regarding the elasticity of demand to the firm for each of its products, and firms producing branded articles with nationwide or regional prices do not conjecture concerning, or adapt to, geographic differences in demand elasticities. Therefore, most manufacturing concerns do not seem, as a general matter, to determine the volume of their output and employment by speculating concerning demand elasticities and by closely following the principle of equating marginal net revenue and marginal factor cost in pecuniary terms for each product.

For such firms, the selling prices of products are assumed to be fixed or to be determined by factors outside the firm's control. Its adjustments occur, not through independent variations in its selling prices, but by shifts between product lines, by changes in product quality and selling expenditures, by improvements in management, and by other nonprice adjustments.

There is need for a thorough reexamination of the conventional demand and marginal-revenue analysis of the individual firm, including investigation of the process of decision-making and nonprice ways of adjustment. Our knowledge of the economics of the individual firm can be greatly improved through discriminating empirical studies of firms that operate under varied circumstances.

UNIONS AND REAL LABOR INCOME

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The enactment of the Labor-Management Relations Act of 1947 promises a fundamental readjustment of the pattern of industrial relations which has developed under the Wagner Act. The year 1946, therefore, may well be viewed in retrospect as the apex of power of free and unfettered unionism. Protected by the Wagner Act in their right to engage in "concerted activities" free of employer interference, and subject only to the formal restriction of a 30-day strike notice required by the Smith-Connally Act, unions wielded the strike weapon with a vengeance. Great cities were darkened, the flow of supplies to Europe was cut off, the automobiles, refrigerators, and radios which war-weary Americans had waited for were left standing unfinished on the production lines. In all, a total of 113,000,000 man-days of idleness were produced by strikes in 1946 alone.[1]

Was it worth it? Did unions serve as an effective instrument to increase the real income of their members? Between November 1945 and November 1946, largely due to the militant pressure of organized labor, average hourly earnings in manufacturing rose from $.99 to $1.13.[2] But in the same period, the BLS index of the cost of living rose from 129.3 to 151.7[3], thus largely offsetting the gain made in money wages. Moreover, in particular industries, the strikes were so costly that it will be many years before the workers affected will have fully recouped their losses.[4]

This record accounts for the hesitancy of labor leaders in ushering in another wave of strikes in 1947. Moreover, it is a record which must have given many a workingman reason to pause and to reconsider just how effective his union was in raising his real income. True, if unions had not demanded higher wages, prices might have risen anyway and thus labor might have fared even more badly; yet the close temporal sequence between wage increases and compensatory price adjustments, which was clear even to the nontechnical observer, should have caused even the most sanguine union leader to doubt whether at the present stage of union development wages can be substantially increased without affecting the general level of prices.

The year 1947 is an appropriate time for labor to pause and to examine its

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[1] Bureau of Labor Statistics Release, Jan. 11, 1947.

[2] *Monthly Labor Review*, Jan. 1947, p. v.

[3] *Ibid.*, p. vi.

[4] Thus, for example, it is estimated that General Motors workers will need 8 years at the new higher rates to make up the pay lost during the 1946 strike. *Factory*, May 1946, p. 121.

balance sheet. On the one hand, it is apparent that labor's bargaining power and ability to strike in key industries will be substantially restricted by the provisions of the new labor law. On the other hand, it is possible that organized labor has reached a stage in its development where henceforth its gains can only be effected at a slower rate.

In the past, union organization has been an investment which has paid its members good dividends. The average union man is far better off today than he was 10 or 20 years ago. Not only does he have greater security and independence, but also his real income has been substantially increased. The cost of unionism, however, has also tended to increase over the same period. Not only have union dues tended to mount,[5] but the cost to labor in time lost through strikes has increased pari passu with the growing scope of union organization. For with unions bargaining on an industry-wide scale, the incidence of work stoppages is much greater and is felt by workers in all industries. Consequently a strike to secure a few cents extra in the pay envelopes of one set of workers may mean the loss of many dollars in the envelopes of other workers who are thrown out of work because of the far-flung effects of strikes in key industries.

If the cost of unionism is rising, what can be said about its benefits? The extent to which unionism can increase the real income of organized labor will depend upon (1) the extent to which it raises the total national product; (2) the extent to which it can increase organized labor's share in a given national product; (3) its efficacy in raising the real income of labor in special situations where exploitation exists. An examination of these possibilities will serve to clarify the role which unions may be expected to play in the future as an instrument to increase the welfare of the American worker.

I

The repercussions of union organization upon real national income will depend: (1) upon its "real effect"; and (2) upon its "investment effect." The first reflects the effect of unions upon workers' effort and upon man-hours expended; the second involves the effect of wage pressure upon cost-price relations, investment incentives, and the volume of expenditures on durable goods.

With regard to the effect of union organization upon real national product, it would be expected on a priori grounds that unions would reduce the flow of goods and services measured in real terms; for unions are essentially monopolistic organizations which apply to the sale of their product—labor—the same principles of restriction of output which a large share of industry adopts in marketing its finished products.[6] This a priori generalization seems to be substantiated in some industries. In the automobile industry, for example, R. J. Thomas,

[5] There is surprisingly little serious statistical data on the total amount of dues, special assessments, and initiation fees collected annually by American trade unions. It is evident that their amount is substantial, and that their income and expenditures class many of the larger unions as big business. For a general article on the subject, see Philip Taft, "Dues and Initiation Fees in Labor Unions," *Quarterly Journal of Economics*, Feb. 1946, pp. 219–32.

[6] For a survey of various restrictive devices practiced by unions, see S. H. Slichter, *Union Polices and Industrial Management*, chap. 6.

then president of the United Automobile Workers, testified before TNEC that union organization had reduced man-hour output approximately 10 per cent.[7] The longshoremen of San Francisco reduced tonnage handled per man-hour about 33.3 per cent according to some shipping authorities.[8]   Similar examples could be cited from other industries.   These slowdowns may have been necessitated by a previous rate of work which was physically debilitating—such as the speed of the line in the Ford factory prior to unionization.   But regardless of whether or not the slowdown was justified, it is apparent that when workers in general restrict output, there is going to be a smaller pie to divide among labor and the other income groups.

On the other hand union-management cooperation in certain industries such as textiles and the garment trades has operated as a factor tending to increase man-hour output.[9]   It is well to point out, in addition, that restriction of output by workers frequently occurs in the absence of unionism.   The recent researches in industrial psychology indicate that unorganized individual restriction may be an expression of insecurity and workers' resentment towards management.[10] Unionism by affording security to workers may operate as a powerful force in removing the fears and antagonisms which are the basis of restriction of output.

Limitation of output and adoption of standards as to what constitutes a "fair day's work" is fairly general in industry.   As Professor Slichter has suggested,[11] such limitations, although they reduce the size of the worker's output per hour, probably increase the output which he is capable of producing over his lifetime and therefore, from the long-run point of view, are socially desirable.   Since many of the restrictive practices employed by unions reflect the workers' lack of security, it seems likely that the wider acceptance by industry of the principle of the guaranteed annual wage would be accompanied by a relaxation of union restrictive rules and regulations.

While restrictive working practices are deeply rooted in the thinking of the laboring man, undoubtedly much can be accomplished by educating the worker to the importance of increasing efficiency so as to make possible rising money wages and falling unit labor costs.   The building trades have been notorious for their make-work rules, yet only recently a New York City local of Electrical Workers, recognizing that such rules are out of place in a labor market where labor is at a premium, agreed to the use of all improved technological methods and high-speed labor-saving devices in order to reduce building costs.[12]   It is to be hoped that other unions will likewise recognize the need for obtaining maxi-

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[7] Temporary National Economic Committee, Hearings, Part 30, *Technology and Concentration of Economic Power*, pp. 16375–16376.

[8] *Business Week*, Jan. 19, 1946, p. 92.

[9] Slichter, *op. cit.*, chaps. 14 & 17.   See also Clinton S. Golden and Harold J. Ruttenberg, *The Dynamics of Industrial Democracy*, particularly pp. 263–291; "From Conflict to Cooperation: a Study in Union-Management Relations," *Applied Anthropology*, Fall 1946.

[10] Orris Collins and others, "Restriction of Output and Social Cleavage in Industry," *Applied Anthropology*, Summer 1946; Stanley B. Mathewson, *Restriction of Output Among Unorganized Workers*.

[11] Slichter, *op. cit.*, p. 165–6.

[12] *Business Week*, Jan. 19, 1946, p. 88.

mum output from the existing labor force, consistent with adequate safeguards to the worker's health; for since labor is the chief consumer of the product of industry, it is to labor's interest that restrictions which reduce output and increase costs of production be eliminated.

A realistic appraisal of the future, however, leads one to believe that restrictions on man-hour output will place an even heavier burden upon the industry of tomorrow. The reason for such a prognostication is that the inclination to restrict output and the age of the union worker are closely correlated. It is of course a well-known fact that America is becoming a nation of older people. Almost a fourth of our people are over 45 already. Between 1930 and 1940 those over 65 rose about 35 per cent, and by 1980 it is estimated that there will be three times as many people over 65 years of age as there were in 1930.[13]

This demographic change is bound to make its influence felt on union policies. The increase in the average age of the union worker, particularly in the strategically placed craft unions, enhances the likelihood that these unions will be used as instruments to preserve the jobs for a privileged few regardless of the means adopted and the effect which such restrictive measures may have upon the rest of the economy. In 1940, half of the employed skilled craftsmen in the construction industry were over 42 years of age.[14] A sample study of carpenters employed in March 1940 indicated that a larger percentage of the men fell within the 55–65 year bracket than within the 25–35 year class.[15] By contrast, 63 per cent of the operative workers in the automobile industry are 39 years of age or under.[16] It is apparent that the concentration of older men in particular unions poses difficult problems of adaptation for such unions in a world in which technological progress is rapid. For a union composed of men in their 50's and 60's, restrictionist policies may seem to make good sense if they succeed in prolonging the jobs of these men for another few years; but when their ultimate effect is to prevent the training of an adequate number of apprentices, and to restrict output by limits designed to protect the older worker, their repercussions upon investment may be damaging to the economy as a whole.

Another factor which will influence the size of the national real product is the amount of man-hours lost through strikes. It may be urged that this item should not be charged to organized labor at all, but rather belongs on the balance sheet of the economy as a cost of reactionary management. Undoubtedly management is primarily responsible for strikes in some situations, while unions are responsible in others. It seems likely, however, that *given a certain number of frictions* between management and labor throughout the economy, the extent to which these frictions will disrupt over-all production will be magnified when bargaining proceeds on an industry-wide basis; and since industry-wide bargain-

[13] Vergil D. Reed, "Reading America's Palm," *Nation's Business*, June 1946, p. 40.

[14] *Post War Capacity and Characteristics of the Construction Industry*, Bureau of Labor Statistics Bulletin No. 779, p. 26.

[15] U. S. Department of Commerce, 16th Census, *Population, The Labor Force (Occupational Characteristics)*, 1940, p. 53.

[16] *Ibid.*, p. 54.

ing seems to be the goal of most unions, time lost through strikes will probably tend to increase rather than decrease in the immediate future.

It is possible of course that the new labor act, through its procedures for dealing with national emergency strikes, will reduce time lost through large-scale walkouts. But the experience of Australia and England with compulsory arbitration suggests that government intervention in the sphere of industrial relations affords no panacea. Ultimately, as both union leaders and management representatives acquire greater confidence in each other in the basic industries, the frequency and severity of strikes will tend to diminish, but it would be sanguine to believe that such a harmonious rapport will be achieved in the next decade. That man-hours lost through strikes can take sizeable chunks out of the national real product is self-evident. It is estimated that during 1946, for example, strikes resulted in the production of 1,000,000 fewer cars,[17] and the loss of 8,000,000 ingot tons of steel.[18] J. D. Small, CPA administrator, stated that the coal strike cost the country $2,000,000,000 in lost production.[19] Thus, as far as the "real effect" is concerned, it seems possible that unions may diminish rather than increase total real national product in the future.

The effect of unions on investment has been the subject of considerable controversy in economic literature.[20] On the one hand, given an inelastic demand for labor, union wage pressure by increasing disbursements to labor may have a stimulating effect upon sales of durable consumer goods. On the other hand, at a certain stage of the business cycle, money wage increases may produce unfavorable cost-price relationships and thus make entrepreneurs hesitant to undertake new investment. Union spokesmen are prone to overemphasize the consumption stimulus without adequate attention to the reaction of costs, while management representatives are apt to be alarmists about rising costs without recognizing the need for expanding labor income to support a rising volume of production. Our present high level of production has not been reached "despite high wages"; for the high level of wage payments affording the prospect of a ready market has been one of the major incentives to expanding investment.

Obviously, however, this does not mean that wage levels can be pushed up 10 to 20 per cent per annum indefinitely. The effect of wage pressure upon investment would seem to have a time dimension: although rising money wage rates may exercise a salutary influence at one stage of the cycle, a continued rise in labor costs may usher in a recession when prices have reached so high a level that consumers adopt a "wait and see" attitude. Moreover, while a continually rising level of wage rates tends to stimulate management to increase efficiency and to substitute machinery for costly hand operations, when costs rise too rapidly the incentive to improve efficiency may be nullified by the impairment of the inducement to invest.

[17] *Factory*, May 1946, p. 121.

[18] *Fortune*, Dec. 1946, p. 115.

[19] "The Cost of Strikes," *The Conference Board Business Record*, June 1946, p. 209.

[20] See, for example, S. H. Slichter, "Notes on Collective Bargaining," in *Explorations in Economics*, p. 280–291; and also A. G. Pool, *Wage Policy in Relation to Industrial Fluctuations*, especially p. 127–128, 123–129.

On balance, it is possible that union organization and union wage pressure will afford some slight stimulus to investment in the future and thus tend to increase the size of the real national product, but when this stimulus is set against the unfavorable real effect of union policies on worker effort and man-hours expended, it seems possible that unions may diminish rather than increase real national income in the future.

<div style="text-align:center">II</div>

If the analysis and conclusions of the first section of this paper are correct, then the gains scored by organized labor in the past have been attributable not so much to any stimulating effect afforded by union organization to *total* real national output, but rather to the effectiveness of organized labor in diverting a larger share of a given national income into the pockets of union members. From whom has this real income been diverted? The philosophy of unionism would seem to call for a reduction in profits and an increase in wage income, but this has not been the result in actual practice. Professor Kalecki's data[21] seem to indicate that both wages and profits have maintained a fairly constant share in the national income in the United States and Great Britain. In 1929, wages and salaries constituted 63.1 per cent of national income in the United States, while entrepreneurial net income was 16.3 per cent.[22] In 1941, wages and salaries were 63.7 per cent while entrepreneurial net income was 16.2 per cent.[23] The experience of the last few years is a vivid reminder that rising wages need not curtail profits. Their concomitant rise is of course largely attributable to the favorable underlying trend in investment and to the inflationary supply and demand situations characteristic of the boom phase of the cycle.[24]

The fact that labor's share of the national income has failed to show any marked increase despite vigorous union organization does not, of course, indicate that unionism has failed to benefit the average worker. On the contrary, it is quite possible that had labor not been afforded the protection of organization during the last few decades, the proportion of the national income going to labor would have actually decreased. The great growth in industrial research in recent years has tended to increase the elasticity of substitution for labor. Consequently, it would be expected that increasing capital would diminish the relative share of labor in the national income. Moreover, the appearance of inventions such as the automatic cotton picker and the automatic strip mill suggests that

[21] Michal Kalecki, *Essays in the Theory of Economic Fluctuations*, p. 16–17. Professor Dunlop has made some improvements in Kalecki's calculations. He also finds that labor's share in national income is fairly constant over the cycle. *Wage Determination under Trade Unions*, chap. 8.

[22] Marvin F. Hoffenberg, "Estimates of National Output, Distributed Income, Consumer Spending, Saving, and Capital Formation," *Review of Economic Statistics*, May 1943, p. 157.

[23] *Loc. cit.*

[24] It has also been suggested that profits tend to rise pari passu with wage rates because management tends to use a fixed percentage of costs in allocating itself a "reasonable profit." See G. Katona, "Psychological Analysis of Business Decisions and Expectations," *American Economic Review*, March 1946, p. 44–62.

the "very labor-saving invention"[25] which may reduce not only labor's relative share but also its absolute share in the national income has been increasing in frequency.   Against this technological background, union leaders may with some justification claim a victory merely by virtue of the fact that labor's share of the national income has remained constant.

But despite the fact that labor as a whole has not increased its share in the national income relative to profits, it is an undeniable fact that organized labor has fared proportionately better than many other income groups during recent years.   Since wages and salaries remained a fairly constant proportion of the national income during the same period, the obvious implication is that organized labor's share in the total national product tended to increase while the share of white collar salaried workers tended to decrease.   Manifestation of this trend in a dynamic economy does not necessarily imply that white collar workers have suffered an actual decline in real income (although this does seem to be the situation, after taxes), but rather that salaried workers have failed to participate in the distribution of the gains of increasing productivity, whereas organized labor has participated to a substantial degree and thereby bettered its position relative to salaried workers.   For example, from 1939 to 1947, average weekly factory earnings increased 105 per cent, while cost of living advanced only 58 per cent, so that organized labor[26] made substantial real gains during this period.[27]   On the other hand, the average salaried employee in October 1947 found that his real income was only 99 per cent of the 1939 standard before taxes, and 10 per cent below 1939 levels, after taxes.[28]   Leaders of organized labor will argue that the remedy for this disparity is organization for salaried workers.   But the question which organized labor will have to face within the next decade is whether it can maintain its rate of increase in real income when other income groups organize in emulation of labor.

The extent to which organized labor can raise its real income relative to other income groups will depend in part (1) upon the size of union wage disbursements relative to all wage and salary payments; and (2) upon the elasticity of supply of the other factors of production.   In the past, when only a few industries were organized, union wage increases did not have much effect upon total wages and the general price level.   Consequently most of the money wage increase obtained was converted into a rise in real income.   Moreover the supply curve of other income groups—school teachers, government employees, and salaried workers—was apparently inelastic, so that despite the fact that their real incomes were reduced or at least did not keep pace with those of organized labor, the volume of services and effort forthcoming was not affected.

[25] See J. R. Hicks, *The Theory of Wages*, p. 126; and Gordon F. Bloom, "Note on Hicks' Theory of Invention," *American Economic Review*, March 1946, p. 83–96.

[26] At least as far as manufacturing is concerned, it does not appear that union members have gained at the expense of unorganized industrial wage earners.   Union organization is now so widespread in manufacturing that nonunion plants must keep their rates in line with union competitors, or see their plants unionized.   Consequently nonunion wages have by and large kept pace with union rates for similar jobs in similar plants.

[27] *US News*, Aug. 15, 1947, p. 33.

[28] *Ibid.*, Oct. 3, 1947, p. 11.

One need only casually peruse a daily newspaper to realize that this situation has undergone a marked change in the last few years.   In the first place, with a majority of all industrial wage earners covered by union contracts,[29] union wage increases have a substantial effect on the total wage bill and therefore upon general prices.   The significance of this influence has been enhanced by the fact that unions in various unrelated industries have adopted the custom of following the size of wage increases in one of the "leader" industries.[30]   Thus, if wage rates are increased $18\frac{1}{2}$ cents an hour in steel, the increase is likely to be duplicated in a wide variety of other industries,[31] many of which are less profitable than steel production, with the consequence that a substantial impetus is afforded to an inflationary movement in general prices.   This rise in prices tends to offset much of the rise in money wages so that organized labor finds it is not much better off after the wage increase than before.

Of equal importance is the changed reaction of the other income groups. White collar workers[32] and an increasing number of professional and technical workers[33] are becoming more and more interested in unionism.   The recent strikes of school teachers and New York Cotton Exchange employees are symptomatic of a change in attitude among white collar workers which cannot fail to have a marked effect upon the efficacy of unions in raising real labor income in the coming years.   For as white collar workers organize, the costs of all services will rise along with the cost of industrial goods and organized labor will find that it has been deprived of the leverage which until now had given it an advantage over these other groups.   Moreover, the divergence in income between common labor and white collar workers has reached such proportions that it can no longer be stated as a hypothesis that the supply of the latter is unaffected by its rate of return.   In practically every state of the Union the number of school teachers has fallen off markedly in recent years.   If this is indicative of a general trend among white collar groups, it is apparent that the amount of their contribution to the national real income will diminish, and that therefore organized labor's enhanced money income will be able to buy only a smaller volume of such services—which is equivalent to saying that the buying power of the workers' dollar will be reduced.

Thus, as organization spreads to other groups, the pattern of union wage adjustments will tend to produce a result somewhat resembling that which char-

[29] In 1945, 67 per cent of the workers in manufacturing industry were working under collective bargaining agreements.   "Extent of Collective Bargaining and Union Recognition," *Monthly Labor Review*, April 1946, p. 567–572.

[30] The importance of key wage bargains in influencing the engire wage structure of the American economy has been pointed out by Professor Dunlop.   "American Wage Determination: The Trend and Its Significance," a paper read before the Chamber of Commerce Institute on "Wage Determination" in Washington, D. C., Jan. 11, 1947.

[31] Bureau of Labor Statistics data indicate that there was a cluster of hourly wage increases around the $18\frac{1}{2}$ cent level for manufacturing industry last year.   "Postwar Increases in Basic Wage Rates," *Monthly Labor Review*, Sept. 1946, pp. 342–346.

[32] O. R. Wessels "Group Bargaining Activities among White-Collar Employees," *NOMA Forum*, March 1946, p. 11–18.

[33] See Herbert R. Northrup, *Unionization of Professional Engineers and Chemists.*

acterized the famous Blum experiment in France.[34]   Wages and prices will rise concomitantly, while the rentier class will be the one to suffer, but the share of labor in the total national real income will not evidence any marked increase. It is a rather strange paradox that the stronger unionism becomes and the broader its scope in industry, the less effective it should become as an instrument to raise the real income of organized labor.   Yet union leaders will have to realize that annual wage increases of 10 per cent cannot be reflected in an equal rise in labor's real income.   Ultimately organized labor's real gains will be limited by the rate of advance of output per man-hour, which over the last 30 years has averaged 3 to $3\frac{1}{2}$ per cent per year in manufacturing[35]

<center>III</center>

There are, however, special situations in which a union can raise labor income without producing any increase in prices in particular industries and if these situations were sufficiently widespread, unions could increase wages at the expense of profits even though wage increases were quite general.   These special situations to which the literature has attached the technical label of "exploitation" have been discussed in various other connections in the economic literature,[36] but it is convenient to consider them together in relation to the problem of this paper.

Given the premise of economic rationality among entrepreneurs, ordinarily, even in the absence of union organization, employers will pay labor its full marginal revenue productivity since this equivalence is essential to attainment of optimum profits.   Exploitation of labor, as it exists sporadically throughout the economy would seem to be mainly attributable to certain peculiarities in conditions of demand and supply for labor and to the unknown quantity of employer inefficiency and ignorance.

That a rising supply curve for labor will produce exploitation of labor is a commonplace familiar to every student of economic theory; hence the basic geometry of this situation need not be dwelt upon in this paper.   Likewise it is apparent that a union, by setting a uniform minimum wage for labor, thereby making the supply curve horizontal at the given wage rate, can eradicate such exploitation completely.   From the point of view of the present discussion, the interesting question is whether unions on balance are more likely to eradicate or to create exploitation which is attributable to rising labor supply curves. Since rising supply curves may be produced by a scarcity of a particular type of labor, the exploitation arising from this source is probably most common

[34] Michal Kalecki, "The Lesson of the Blum Experiment," *Economic Journal*, March 1938, p. 26–41.

[35] "Productivity Changes Since 1939," *Monthly Labor Review*, Dec. 1946, p. 894.   For basic data relating to productivity increases in American industry, see S. Fabricant, *Employment in Manufacturing, 1899–1939.*

[36] Edward H. Chamberlin, *The Theory of Monopolistic Competition*, p. 183 ff.; Joan Robinson, *The Economics of Imperfect Competition*, chap. 18; Gordon F. Bloom, "A Reconsideration of the Theory of Exploitation," *Quarterly Journal of Economics*, May 1941, p. 413–442.

among skilled crafts.   However, since they are the very groups which are likely to be organized, it would appear that unions are an effective agent tending to eliminate this form of exploitation and the excess profits associated with it.

But unions are also an instrument for *making* labor scarce and therefore union regulations themselves may give rise to exploitation.   Restrictive membership policies, long apprenticeship requirements and similar devices tend to create an artificial scarcity and thus produce a rising supply curve for labor even in trades where none would have existed in the absence of unions.   These rules, however, create the scarcity in the union plant where the union can deal with the exploitation by setting uniform minimum rates for particular types of labor; consequently these union policies are not likely to produce continuing exploitation of labor.

Other union policies, however, tend to produce a rising supply curve for labor in *nonunion firms*, and in these cases the ensuing exploitation is much less likely to be eliminated.   Such a result may follow from widespread adoption of seniority plans in unionized firms, which reduces the general mobility of labor.   Suppose, for example, that there are four small furniture companies in a particular locality and that demand for the product of one of them increases without any change in the demand for the products of the others.   Then, in the absence of any special advantage offered by one company, this employer should be able to obtain all the extra labor he needs in response to a very small increase in the wage rate so that for all practical purposes his supply curve for labor may be considered perfectly elastic, or very nearly so.   But if the other three firms become unionized and the union institutes a seniority program, employees will be reluctant to leave their established employments and lose their preference unless they are offered much higher wages as an inducement.   Hence the effect of union-sponsored seniority plans upon other firms in the industry or locality is to decrease the elasticity of supply of labor and thus to produce conditions conducive to exploitation.

That unionism and monopsonistic exploitation are antithetical is evident almost from the definition of the terms.   As Mrs. Robinson has pointed out, monopsonistic exploitation may be of two kinds: either payment at different rates to men of the same efficiency, or payment of the same wage to men of different efficiency.[37]   Exploitation of the first type is likely to be common in depression periods when men are willing to take a job at any price and the minimum price which they are willing to accept differs because of the variation in the burden of responsibilities.   Union organization is of course a strong factor in combatting such competitive wage-cutting by the workers themselves.   Moreover payment of union out-of-work benefits may make workers less willing to accept low wages.   Exploitation of this type can be eradicated by imposing a minimum wage equal to the wage paid for the most expensive man and since it is union practice to insist upon uniform payment for men of equal efficiency performing the same or similar jobs, unionism tends to eliminate this type of exploitation.

In the second type of exploitation, it would be necessary for the union to demand a different wage for each level of efficiency in order to eliminate all exploita-

[37] Robinson, *op. cit.*, p. 300–301.

tion.   Actually the union is more likely to demand a wage equal to, or greater than, the average wage of the group, in which case a sort of average equilibrium is restored.   In effect this means that the men of above average efficiencies aer exploited by the workers of lesser efficiencies who are paid the same wage.   However, union rules regulating worker output tend to level out individual production and thus make the outputs of all the men conform more closely to the average. Even where the union sets the wage rate equal to the average efficiency for the group, the profits of the employer will be reduced; for while the union will permit variations in efficiency below the average, production above the average is frowned upon, and as a consequence the employer tends to get the losing end of the bargain.

It is now commonly recognized that demand and marginal revenue curves may be discontinuous under oligopoly.[38]   In this situation, a change in wage rates and therefore in marginal costs will not affect output, employment, or price if the new marginal cost curve intersects the marginal revenue curve within the discontinuous range.   The conception of the discontinuous demand and marginal revenue curve is of particular significance in connection with the diagnosis of equilibrium conditions under long-term administered prices, a phenomenon common to a large segment of American industry.

Suppose that the demand curve for the product of all industry could be represented by the demand curve with a "corner" which has become an oddity of the literature.   Suppose further that the marginal cost curve cut below the corner.   Then as technological progress lowered marginal costs still further, there would be no incentive to reduce prices concomitantly and labor would tend to be exploited as a consequence.   Obviously this example does not represent reality, yet it is possible that certain of its elements were present during the twenties when the price and wage level remained fairly stable despite rapid progress in the arts.   Technical advance tends to raise the absolute marginal productivity of labor even when inventions are labor saving.   Consequently, unless money wages rise or prices fall, a discrepancy will develop between the product of labor and its wage.   The difficulty is that the entrepreneur in modern industry is in a position where he can retain a large share of the gains of increased productivity without sharing it with labor or the consumer.

Thus, the introduction of the continuous strip mill in the steel industry resulted in a 57 per cent reduction in labor costs.   There was a decline in cost of production of tin plate amounting to $17.77 per ton.   The price of tin plate, however, was not reduced.   Neither were the wages of the workers increased.[39]   A study made by the Temporary National Economic Committee indicates that in such concentrated industries as automobiles, cigarettes, cement, iron and steel, nonferrous metals, and electric light and power, there is a marked divergence between

[38] See Paul M. Sweezy, "Demand under Conditions of Oligopoly," *Journal of Political Economy*, Aug. 1939, p. 568–573.

[39] Clinton S. Golden, "The Economic Effects of Cost Reductions," *Advanced Management*, July-September 1940, p. 106.

prices and unit labor requirements. While unit labor requirements in these industries continually declined, prices showed considerable stability.[40]

Consequently technological advance in conjunction with long-term administered prices may create the possibility of long-run exploitation of labor. The statistical evidence indicates that during the twenties the increase in output per man-hour substantially exceeded the increase in hourly earnings.[41] Insofar as unions accelerate the upward trend of wage rates, they tend to reduce exploitation of this type and thus divert to labor a share in the national product which would otherwise have gone into profits. During the latter part of the thirties when unions were particularly active, it appears that wage increases almost succeeded in absorbing all of the increase in productivity.[42] Since the averages of wages for this period are compounded of both union and nonunion wage rates, union wage rates may have fared even better in the race with productivity.

Finally, we must briefly note the possibility of regional exploitation of labor. It is well known that wage rates in the South are lower than in other sections of the country for comparable types of work.[43] Are such differences in wage rates to be accounted for by regional differences in workers' productivity? Lester's statistical findings would tend to indicate that such is not the case.[44] In comparable plants and on similar jobs there is evidence to suggest that southern labor is as efficient as northern labor—and indeed in some instances even more efficient.[45] The coexistence of such wage differentials between North and South and apparently equally efficient labor forces *may be* an indication of the exploitation of southern labor.[46] Union organization of the South may succeed in elimi-

[40] TNEC Monograph No. 22, *Technology in our Economy*, p. 234–288.

[41] Spurgeon, Bell, *Productivity, Wages and National Income*, p. 49. Output per man-hour is a statistical aggregate obtained by dividing total output by man-hours. It therefore reflects not merely the effect of rising labor productivity, but of increasing capital as well. As a consequence, divergence between man-hour output and prices, or unit labor requirements and prices, does not necessarily afford evidence of exploitation, since the apparent hiatus may be filled by rising unit capital costs. The discussion of this section must be read with this important qualification in mind, and therefore must be taken as setting forth a theoretical possibility, rather than asserting the only possible inference from the facts.

[42] *Ibid*, p. 50 and p, 173.

[43] For statistics on regional wage differentials see "Labor in the South," *Monthly Labor Review*, Oct. 1946, p. 511–525; C. Glasser, *Wage Differentials*, chap. 5.

[44] Richard A. Lester, "Effectiveness of Factory Labor: South-North Comparisons," *Journal of Political Economy*, Feb. 1946, p. 60–75 and "Diversity in North-South Wage Differentials and in Wage-Rates Within the South," *Southern Economic Journal*, Jan. 1946, p. 254–260.

[45] Lester, "Effectiveness of Factory Labor, South-North Comparisons," p. 64.

[46] Regional wage differentials do not necessarily prove the existence of exploitation. The problem arises in the definition of "productivity." Suppose one finds that a northern worker can tend 100 bobbins per hour and that a southern worker can tend 110 bobbins per hour. Obviously it would be erroneous to conclude from the evidence of the *physical* productivity of the two workers that the southern worker should be paid more than the northern worker. For the important consideration in wage determination is marginal *revenue* productivity, not mere physical productivity. Now if the wage rate is lower in the

nating these differentials and thus increase the real income of southern workers (assuming, of course, that southern plants are not forced out of business).

This brief review of exploitation theory serves to indicate that unions can effectively eliminate most types of such discrimination and thus add to labor's real income at the expense of profits. However, in evaluating the significance of these special situations with regard to the efficacy of unions in raising real labor income in the future it is important to distinguish two aspects of unionism: (1) the initial impact of union organization; and (2) the effect of continuing union wage pressure. Generally speaking, exploitation is nonrecurring. When a union comes into an unorganized plant and eliminates exploitation, labor's real income is augmented at the expense of profits; these gains, however, are the fruits of the initial organization and once the plant has been organized and the existing exploitation eliminated, subsequent union wage increases are not cushioned by the presence of profits of exploitation and consequently are likely to be reflected in price adjustments. Undoubtedly, there remain many areas in which pockets of exploitation still exist—particularly in the unorganized South— and as these localities are brought into the sphere of union influence, labor's real income will be increased. But obviously the field for such salutary action is limited.

On the other hand, the discrepancy between marginal revenue product and money wage which tends to develop from the combination of long-term administered prices and rapid technological progress is a continuing one. Continual increases are therefore possible in wage rates without producing an offsetting adjustment in prices as long as the rate of increase in union wage rates does not exceed the rate of increase in labor productivity. But the rate of increase in productivity, as has already been observed, averaged only 3 per cent per annum, while the rate of increase in wage levels since 1941 has averaged 7–10 per cent per year.[47]

Thus, we are brought back to the conclusion stated at the end of Section II that unions will have to content themselves with a slower rate of improvement in real wages[48] in the future. Unions are an essential part of our modern industrial organization. They have made a great and lasting contribution in affirming

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South, costs will be lower than in the rest of the industry, *ceteris paribus*, and therefore more workers will be employed in a plant of a given size in the South than in the North, since marginal costs will be lower. Consequently, with a larger output, the addition to total revenue of the marginal worker will be less and therefore it is quite possible that despite the lower money wage in the South, the southern worker is paid a wage equal to his marginal revenue productivity. While statistical evidence tends to indicate that there is no greater labor to equipment ratio in the southern plants of inter-regional concerns than in their northern plants, this condition is undoubtedly attributable in large part to the fact that the southern plants are newer and more highly mechanized.

[47] Bureau of Labor Statistics, *The Trend of Urban Wage Rates*, p. 10.

[48] The term "real wages" has been used in this article to describe the goods and services which a given money wage represents. The extent to which increasing leisure is acceptable to the average workingman as a substitute for the more material constituents of the real wage is debatable. Probably below 40 hours a week, increasing leisure is acceptable only if compensated by an increasing real hourly wage rate for hours worked.

the dignity of the common worker and in giving him a new sense of independence and security in his job. By securing higher real wage rates, unionism has enabled the worker to share in the gains of technological progress. But organization has now become so widespread that it is folly to argue that large wage adjustments can be made in *any* industry without engendering a sequence of events which will ultimately affect the general level of prices and thus rob the wage increase of much of its effect.

The most effective weapon with which to achieve a redistribution of national income in favor of labor at the expense of profits is a progressive tax structure. But sharp wage increases, which alienate large groups of the voting public, succeed only in placing tax policy in the hands of a Republican regime and thus deprive labor of its best weapon. In the next few years, moderation in wage demands may have to be a sine qua non of union policy; to embark upon an all-out attempt to outrun the inflationary spiral would not only have disastrous results upon the economy but would run the risk of antagonizing those fixed income groups upon whom labor must rely for the continuance of a friendly political atmosphere.

THE CONSUMPTION FUNCTION CONTROVERSY*

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I

The consumption function is a statistical relationship, of disputed stability, between national income and national consumption. Its form is usually taken as linear. "Income" is treated as the independent variable, and the "income" figures used refer usually to *disposable* income, after deduction of personal taxes. "Consumption" is the dependent variable, and may refer either to consumer expenditures as a whole or to some major subdivision, such as expenditures on durable goods.

The consumption function has particular importance in the Keynesian system, for its slope is the "marginal propensity to consume" and bears a simple mathematical relationship to the multiplier. It should not be confused with the "family" consumption functions of budget studies, which compare the patterns of personal consumption of families in different income groups.[1]

In Keynes' symbols, Y represents income, C consumption, and I investment. All income payments arise by expenditure for consumption or investment, yielding a basic identity from which a series of further identities is derived.[2]

$$Y = C + I$$

$$\frac{dC}{dY} + \frac{dI}{dY} = 1$$

$$\frac{dC}{dY} = 1 - \frac{dI}{dY} \tag{1}$$

$$\frac{dY}{dI} = \frac{1}{1 - \dfrac{dC}{dY}} \tag{2}$$

None of these expressions, being identities, represents the consumption function, which is a descriptive equation. The term dC/dY, however, is the *slope* of the consumption function, i.e., the marginal propensity to consume. In Keynes' system, it is positive but less than unity, especially in the short run, as a matter of "fundamental psychological law"; critics have been more hesitant in

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* Revision of a paper presented to the Federal Reserve System Committee on Current Business Developments, Federal Reserve Bank of New York, May 28, 1947. The views presented are the writer's own, and may not coincide with the position of the Federal Reserve Bank of Chicago, with which he was then affiliated.

[1] This point has received recent stress from Alvin H. Hansen, *Economic Policy and Full Employment*, p. 161.

[2] Keynes' original development is slightly elliptical and obscure. Cf. J. M. Keynes, *General Theory of Employment Interest and Money*, p. 115.

discarding other possibilities. The term dY/dI, representing the increase in income resulting from an increase in investment, is the celebrated multiplier, center of a substantial volume of dispute, but assumed by Keynes and his school to be positive and greater than unity. Identities (1) and (2) can be expressed verbally, and their verbal expression indicates the importance of the consumption function in Keynes' system:

$$\text{Marginal propensity to consume} = 1 - \frac{1}{\text{multiplier}} \qquad \text{(1-a)}$$

$$\text{Multiplier} = \frac{1}{1 - \text{(marginal propensity to consume)}} \qquad \text{(2-a)}$$

II

The consumption function *controversy* arises from the use of statistical consumption functions by economists, mainly of Keynesian persuasions, as major parts of econometric models. These models were used in turn to prepare forecasts of the course of American business after V-J Day, and to suggest policy recommendations based on these forecasts. Many of these economists used similar consumption functions among the key equations in models allegedly determining the ability of a full-employment American economy to sustain itself at this level, once the postwar replacement boom will have died down.

The pessimistic error of the first set of forecasts is now a matter of embarrassingly common knowledge, particularly with regard to the overestimate of the volume of unemployment in 1946–47. For example, Mr. V. Lewis Bassie, then economic adviser to the Secretary of Commerce (Mr. Henry A. Wallace) forecast in an article published as recently as August 1946, although written some months before:[3]

In the summer of 1946, unemployment may exceed 7 million, as rising civilian employment and reductions in working hours turn out to be insufficient to absorb the additions to the labor force consequent upon the rapid discharge of workers from the armed forces. Throughout 1947, employment will rise slowly, bringing unemployment down to 5 million. Thereafter unemployment will tend again to increase, as employment remains steady or declines slightly while the labor force continues to grow."

The policy recommendations to which such forecasts led seem to have been generally incorrect. For example, the wage increases advocated in major industries to forestall deflationary pressure have added to inflation potentials by increasing both cost and demand. Professor A. G. Hart[4] has listed eight major economic policy decisions allegedly made on the basis of these post-V-J forecasts, all of which he considers erroneous. The unfortunate consequences for the

[3] V. Lewis Bassie, "Consumers' Expenditures in War and Transition," *Review of Economic Statistics*, Aug. 1946, p. 126. The most complete statistical comparison of a "projection" and the actual data is found in Everett E. Hagen, "The Reconversion Period: Reflections of a Forecaster," *ibid.*, May 1947, p. 96 f.

[4] Albert Gailord Hart, "National Budgets and National Policy: A Rejoinder," *American Economic Review*, Sept. 1946, p. 636.

economic profession and for the entire United States have been summarized by Dr. W. S. Woytinsky,[5] one of the relatively few "optimists" of 1945, whose views as to the predominantly inflationary nature of postwar economic problems have been borne out in the first two postwar years:

" The false prophets of a postwar depression have deeply discredited the science of economics in the eyes of the American public, and inasmuch as their views were publicized as those of the federal government, they have also discredited the government. . . .No less important was the impact of these erroneous forecasts abroad. By portraying this nation as a colossus with feet of clay, they undermined the international prestige of the United States at a time when this nation was the only power able to consolidate peace in the world; by predicting an economic collapse in America, they inspired fear in those who otherwise would have accepted this country's leadership and bolstered the hopes of those who regarded international turmoil as favorable for their plans."

The imperfections of the post-V-J Day forecasts have given rise to a swelling volume of controversy regarding "econometric model" analysis in forecasting or "projecting"[6] the economic future for shorter or longer periods, and also in estimating the ability of the American economy to maintain itself at an assumed level of full employment after the satisfaction of demands deferred from the war period. (These two groups of applications are sometimes confused, even by trained economists and statisticians. The first calls for a much higher degree of virtuosity in estimating investment factors and in applying special allowances for domestic and foreign "abnormalities" than does the second. Wherefore, the use of models may be practicable for the second purpose although not for the first, and the inadequacies of model analysis in forecasting need not be equally damaging in estimates of the self-sustaining character of full employment.)

Within the discussion of Keynesian models in general, problems of the reliability and stability of their consumption function elements have been prominent throughout. In reviewing the discussion to date (September 1947), I shall concentrate upon these aspects, although occasional forays into other sectors cannot be avoided.

Is the consumption function discredited for use in economic forecasting? Here we have the nub of the controversy. Dr. Lawrence R. Klein of the Cowles Commission is the most articulate and forthright among the function's defenders.

[5] W. S. Woytinsky, "What Was Wrong in Forecasts of Postwar Depression?" *Journal of Political Economy*, April 1947, p. 142.

[6] In so far as a "projection" is other than a forecast in cowardly disguise it is usually multiple in character, attempting to allow for alternative possibilities of legislative and other institutional development. The post-V-J Day forecasts were labelled "projections" at the time, however, "primarily because they deliberately left out of account certain developments which were expected to occur. In order that they should not confuse the effects of public actions with the circumstances necessitating those actions, the projections made no allowance for the mitigating effect of government measures which would presumably have been adopted if the unemployment foreseen had actually developed." Thus Hagen (*op. cit.*, p. 95), preceding an admission that "the projection was a forecast of the strength of forces operating on the level of output and income and upon the demand for labor."

His position, summarized in two outstanding periodical articles,[7] ascribes the mistaken forecasts for 1945–46 to technical errors, reflecting not at all on the method in general and unlikely to be repeated in future applications. In an earlier test (1940-42), Klein reminds economists, Keynesian models gave better results than any other methods in predicting America's ability to convert to war production without serious inflation. And for the postwar transition, Klein obtained (but did not publish) accurate forecasts by the use of a model which, like the others under discussion, placed great reliance on a consumption function.[8] With his fellow-workers at the Cowles Commission, he has continued to use the method in preparing forecasts through fiscal 1948, and he has sought to apply similar methods to the Canadian economy.

Despite the use of his own forecast as a whipping boy by his opponents, Everett E. Hagen of the Bureau of the Budget also continues a staunch defender of the consumption function-econometric model approach,[9] although somewhat more given than Klein to place his defense on a *faute de mieux* basis and far more willing to recognize the susceptibility of his mathematics and statistics to contamination from his "theoretical *a priori.*"[10]

Outside the sectarian confines of the econometric school, the prevalent out-

[7] Lawrence R. Klein, "A Post-Mortem on Transition Predictions of National Product," *Journal of Political Economy*, Aug. 1946, pp. 289–306, and "The Use of Econometric Models as a Guide to Economic Policy," *Econometrica*, April 1947, particularly pp. 111–113 and 138 f.

[8] A pessimistic error involved in Klein's estimate for fiscal 1947 (gross national product $177.5 billion, disposable income $83.3 billion) is explained by Klein himself as due to his substitution of an arbitrary percentage price increase factor for the price-level-determining equation (3,3) of his Model III. Klein, "Use of Econometric Models," *op. cit.*, pp. 129, 133, note 13.

Preliminary "model" estimates for fiscal 1948, presented to the Chicago Chapter of the American Statistical Association by Kenneth Arrow of the Cowles Commission in mid-June, 1947, are as follows:

QUARTER AND YEAR	GROSS NATIONAL PRODUCT ($ BILLION)	NUMBER OF UNEMPLOYED (MILLION)
4th Quarter 1947	192	4.7
2d Quarter 1948	184	6.0

An additional billion dollars of government spending for international relief is estimated to raise the later figure for gross national product by $6 billion and lower the corresponding figure for unemployment by a million men.

[9] In addition to the *Review of Economic Statistics* article already cited, Hagen and Mrs. Nora Boddy Kirkpatrick have prepared a longer paper, entitled "Forecasting Gross National Product and Employment during the Transition Period," which is to be published in Vol. X of the National Bureau of Economic Research *Studies in Income and Wealth*. (I have not had access to this unpublished manuscript in the preparation of the present essay.)

[10] A passage from his "Reflections of a Forecaster" (*op. cit.*, p. 101), is both frank and symptomatic: "We must be critical of our preconceptions. . . . I suspect that, in my own case at least, a main reason I failed to give anything like adequate consideration to [the possible rapidity of physical reconversion] was that I was bemused by my preconception of a deflationary period during the reconversion interval. More critical and imaginative self-analysis would probably have considerably improved my forecast."

look is more critical and skeptical. The attack on "model-building" in general has been led by Professor Hart,[11] and that on the consumption function in particular by Dr. Woytinsky.[12] The most elaborate and careful full-dress review of the transition forecasts which I have seen, Dr. Michael Sapir's unpublished manuscript,[13] also terminates in a mood of chastened and reluctant agnosticism.

III

The use of the consumption function in forecasting can be illustrated with the aid of a simplified Keynesian model, adapted to econometric analysis but not presented as identical in all details with any of the models actually used by Messrs. Hagen, Mosak, Smithies, *et al.*, to say nothing of the three Cowles Commission models which Klein has presented *in extenso*.[14]

In this simplified model, eight variables are involved, which are listed together with their respective symbols:

GNP — Gross National Product
Y — Disposable Income
C — Consumption
I — Investment (Private Capital Formation)
G — Government Expenditures (for Goods and Services only)
L_1 — Total Labor Force
L_2 — Total Employed Labor Force
U — Number Unemployed

Two of these eight variables, G and L_1,[15] are considered as "given" autonomously or exogenously. Though variable in time, their fluctuations are taken to be largely independent of the movements of the remainder of the system. The remaining six variables are considered as unknowns, and are balanced by a corresponding number of equations. (Equations 3–8 written below in functional notation.) Two of these equations (3–8) are identities; equation (5) is the statistical consumption function.

$$\text{GNP} = C + I + G \tag{3}$$
$$Y = Y\,(\text{GNP}) \tag{4}$$
$$C = C\,(Y) \tag{5}$$
$$I = I\,(\text{GNP, } Y) \tag{6}$$
$$L_2 = L_2\,(\text{GNP}) \tag{7}$$
$$U = L_1 - L_2 \tag{8}$$

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[11] Hart's initial contribution, " 'Model-Building' and Fiscal Policy," *American Economic Review*, Sept. 1945, pp. 531–58, appeared even before the post-V-J forecasts had been demonstrated to be erroneous. See also his "National Budgets and National Policy: A Rejoinder," *ibid.*, Sept. 1946, pp. 632–36, in reply to Dr. Jacob L. Mosak.

[12] In addition to the *Journal of Political Economy* article referred to above (note 5), Woytinsky's principal objections are found in his essay, "Relationship Between Consumers' Expenditures, Savings, and Disposable Income," *Review of Economic Statistics*, Feb. 1946, pp. 1–12. A second essay, "Consumption-Saving Function: Its Algebra and Philosophy," presently available only in manuscript, is scheduled for future publication in the same journal.

[13] Michael Sapir, "Review of Economic Forecasts for the Transition Period," which is to appear in Vol. X of the National Bureau *Studies in Income and Wealth*.

[14] Klein, "Use of Econometric Models," *op. cit.* pp. 113–138.

[15] Some or all of the components of *I* are frequently treated as exogenous in addition.

Equation (3) defines gross national product (or expenditure) in terms of its three principal constituents; equation (4) gives disposable income as a function of the gross national product, approximating the various adjustments, principally downward, made quarterly by the Department of Commerce in deriving disposable income estimates;[16] equation (5) is the consumption function, to which major attention will be devoted; equation (6) may be called an "investment function," and is presented here as a shortcut for the great number of separate relationships actually used to build an estimate of private capital formation up from its components when it is not treated as autonomous;[17] equation (7) estimates the demand for labor in terms of gross national product; in practical work, a time or a productivity factor is ordinarily introduced into the equation as an adjustment for the effects of technological advances; equation (8) is a definition of the volume of unemployment.

Models of this type were modified somewhat in their application to the post-V-J forecasts of 1945–46, primarily because of the anticipated and actual shortages of durable goods for both consumption and investment. All private capital formation factors (I) were treated as autonomous variables, limited only by the volume of investment goods estimated to be physically available. In the most widely publicized forecasts (such as Hagen's), consumption was divided into four parts, and separate consumption functions plotted. C_1 (consumption of nondurable goods) and C_2 (consumption of services other than rent) were estimated on the basis of separate prewar group relationships to Y, which relationships had continued to hold during the period of hostilities, especially so in the case of C_1. A small arbitrary addition was made to the estimate of C_1 to allow for the effects of military demobilization, i.e., for purchases by veterans recommencing civilian life. On the other hand, C_3 (consumption of durable goods) and C_4 (consumption of rent services) were treated in the same way as I, in other words as given technically on the basis of physical reconversion schedules.

For the immediate postwar period, then, the "model" equations to be solved simultaneously were not (3–8) but the alternative family:

$$
\begin{aligned}
\text{GNP} &= C + I + G & (3) \\
Y &= Y\,(\text{GNP}) & (4) \\
C_1 &= C_1\,(Y) & (5\text{-a}) \\
C_2 &= C_2\,(Y) & (5\text{-b}) \\
C &= C_1 + C_2 + C_3 + C_4 & (5\text{-c}) \\
L_2 &= L_2\,(\text{GNP}) & (7) \\
U &= L_1 - L_2 & (8)
\end{aligned}
$$

[16] See, e.g., Office of Business Economics, U. S. Department of Commerce, "The Economy in Reconversion; A Review of 1946," *Survey of Current Business*, Feb. 1947, p. 7, Table 3. A brief elementary summary of the rationale involved is found in Milton Gilbert and George Jaszi, "National Product and Income Statistics as an Aid in Economic Problems," reprinted from *Dun's Review* (Feb. 1944) in American Economic Society, *Readings in the Theory of Income Distribution*, pp. 44–54. All references to Department of Commerce national income series are to concepts used and figures published before the basic revision of 1947.

[17] Compare Klein, "Use of Econometric Models," *op. cit.*, the discussion of "Model III," pp. 125–35.

Simultaneous solution of these equations, together with the assumed autonomous values of I, G, C_3, C_4, and L_1, yielded results which, as all know, proved unduly pessimistic. The results of a comparison between Hagen's observations for the first three complete postwar quarters[18] are shown as Table 1. Money figures are in current dollars, and all figures are seasonally adjusted annual rates.

Except for the unemployment figures which the critics have stressed, this forecast is not so erroneous in percentage terms as it has been painted. (This illustrates the importance for policy of differences which may appear quite small on a quantitative and even smaller on a percentage scale—not the least of the hazards of the forecasting game!) As for the unemployment figure itself, it is singularly subject to large percentage errors by its position as a differential between two larger figures, the labor force and employment (L_1 and L_2). If estimates of the two larger figures err slightly in opposite directions, a considerably larger change percentagewise, either positive or negative, results in the estimate of unemployment.

Attention has been concentrated generally on the comparisons relating to the final quarter of 1945. Their position in time renders them relatively free of any cumulative effects of errors for prior periods. In addition, the acceleration of demobilization beyond expectations, and the consequent sharp drop in government payments for goods and services, do not put in their appearance until 1946. For this quarter, aside from the unemployment estimate (which has been shown in a sense derivative) the major percentage errors were in estimates of private capital formation and consumers' expenditures. Each error amounted to roughly 15 per cent.

The error in forecasting capital formation does not concern the present discussion. It does not rest upon the consumption function, and indeed the total importance of the economic factor is comparatively slight. It was in large part an engineering or technological blunder, an underestimate of the maximum possible speed of physical reconversion, particularly in the construction trades.[19] A basic economic postulate, the full absorption of total capital goods production, proved substantially correct.

The error in forecasting consumption expenditures, however, especially expenditures for nondurable goods, *was* economic, *did* involve the consumption function, and provided the basis for the pragmatic attack on consumption function analysis. (The consumption-function method showed to much better advantage in the forecast of expenditures for services—a point understandably overlooked in the controversy.) A glance at Table 1 shows an underestimate of over 18 per cent in nondurable goods consumption, an especially disappointing showing when compared with two fortuitously accurate[20] estimates for durable goods, which had been treated as exogenous!

[18] Figures selected from Hagen, "Reflections of a Forecaster," *op. cit.*, p. 96 f. Compare Klein, "A Post-Mortem," *op. cit.*, p. 292.

[19] Compare on this point Hagen, "Reflections of a Forecaster," *op cit.*, p. 99.

[20] "Fortuitously" accurate primarily because of the effects of unforecast steel and automobile strikes in holding production to the low level estimated for midyear of 1946.

TABLE 1

Hagen's economic projection compared with actual data, quarterly, September 1945–June 1946

ITEM	SYMBOL	UNITS	4TH QUARTER 1945			1ST QUARTER 1946			2ND QUARTER 1946		
			Projection	Actual	% Error	Projection	Actual	% Error	Projection	Actual	% Error
Gross National Product	GNP	$ Billion	164.6	185.2	−11.1	161.8	182.2	−11.2	165.2	189.6	−12.9
Disposable Income	Y	"	119.9	136.9	−12.4	120.9	138.0	−12.4	122.5	141.8	−13.6
Consumer Expenditures	C	"	96.2	113.0	−14.9	99.5	120.9	−17.7	104.6	122.0	−14.3
Nondurable Goods	C_1	"	57.7	70.6	−18.3	58.2	75.1	−22.5	58.9	74.0	−20.4
Durable Goods	C_3	"	9.0	9.0	0.0	10.5	11.6	−9.5	13.0	13.0	0.0
Services*	$C_2 + C_4$	"	29.5	33.3	−11.4	30.8	34.2	−9.9	32.7	35.0	−6.6
Private Capital Formation	I	"	12.8	15.0	−14.7	13.3	22.2	−40.1	17.1	31.6	−45.9
Government Expenditures for Goods and Services	G	"	55.5	57.2	−3.0	49.0	39.1	25.3	43.5	36.0	20.8
Total Labor Force	L_n	Million Men	63.2	60.3	4.8	62.8	58.9	6.6	62.1	58.8	5.6
Employment (including Armed Forces)	L_2	"	56.9	58.3	−2.4	54.7	56.2	−2.7	54.7	56.2	−2.7
Unemployment	U	"	6.3	2.0	215.0	8.1	2.7	200.0	7.4	2.6	184.6

* Actual data for rent expenditures (C_4) not given separately from other services (C_3).

IV

The statistical objections to consumption-function analysis, while focused on the basic issue of reliability, tend to concentrate about three subordinate problems.   One is the problem of instability; the second is the (related) problem of selection of proper independent variables; the third is the problem of aggregation—specifically, is the consumption function simple, as in (5), or compound, as in (5 a-c).

A leading cause of instability and unreliability in statistical consumption functions is the inclusion of consumption in income.   "Unusually high correlation coefficients," as Dr. Louis H. Bean has pointed out,[21] "are invariably and inevitably obtained when an income series is correlated with about 90 per cent of the same series in the form of expenditures."   To remedy the resulting sense of false statistical security, Bean suggests analyzing savings rather than consumption, as a function of income, for "while it is customary and reasonable to tolerate a small error of say 2 per cent in estimating or forecasting expenditures, a 2 per cent error in estimating expenditures is equal to a 20 per cent error in the derived estimate of savings, with expenditures constituting 90 per cent of income."

The suggestion that some related function may be more reliable statistically than the consumption function itself is not new.   It has been supported with a greater degree of mathematical and statistical refinement by Dr. Trygve Haavelmo,[22] who derives the multiplier statistically (together with a "confidence band") and hence, utilizing (1), the marginal propensity to consume.   If the consumption function is computed directly, Haavelmo shows further, the least-squares estimate ordinarily made involves an upward bias in the size of its slope (the marginal propensity).   He insists on the use of the "simultaneous equations approach" which he and his co-workers have developed.[23]

Surprising as it seems, few if any of the post-V-J "projectors" thought of checking the reliability of their consumption functions by application to periods

[21] Louis H. Bean, "Relation of Disposable Income and Business Cycle to Expenditures," *Review of Economic Statistics*, Nov. 1946, p. 201.

[22] Trygve Haavelmo, "Methods of Measuring the Marginal Propensity to Consume," *Journal of the American Statistical Association*, March 1947, pp. 105–122, particularly the following verbal summary at p. 106: "It is somewhat surprising to find that current attempts to derive, statistically, the marginal propensity to consume approach the problem by correlating consumers' expenditures with income.   This procedure is inconsistent with the view that investment is the autonomous determinant of income.   We should, instead, take the regression of income *on investment*, to obtain the multiplier, and from this estimate of the multiplier we should derive the marginal propensity to consume."   (Italics Haavelmo's.)

[23] Of the growing literature on the "simultaneous equations approach," three readily accessible papers are: Haavelmo, "The Probability Approach in Econometrics," Supplement to *Econometrica*, July 1944, Tjalling Koopmans, "Statistical Estimation of Simultaneous Economic Relations," *Journal of the American Statistical Association*, Dec. 1945, pp. 448–466, and M. A. Girshick and Haavelmo, "Statistical Analysis of the Demand for Food: Examples of Simultaneous Estimation of Structural Equations," *Econometrica*, April 1947, pp. 79–110.

earlier than those which had supplied their basic data (usually 1921–41). The check, left to the critics,[24] has produced disconcerting results. The functions used so confidently to forecast 1946–50 conditions back-cast badly for periods prior to World War I. In particular, they indicate consumption greater than income (i.e. negative savings) for such "normal" years as 1909 and 1913, when savings were in fact positive.

The consumption function as written by Keynes,[25] and in our (5) with its variations, is a two-variable function. Income is the independent, consumption the dependent variable; no additional variables enter. Nearly all writers who have attempted an actual statistical fit add in practice certain other variables which they feel must be included in statistical consumption functions if instability is to be avoided. Among the additional variables most frequently or persuasively mentioned are a time trend, the stage of the business cycle, the rates of change of income, the price level, the population and its distribution, and the volume of liquid assets held by consumers.

1. An "upward drift" of the consumption function through time, as living standards rise and luxuries assume the character of necessities, was suggested and illustrated by Professor Paul Samuelson[26] in 1943. Consumption functions with rising time trends were fitted to American consumption data by U.S. Department of Commerce economists in the following year.[27] Each of these consumption functions with built-in trends, however, related to relatively small segments of consumption.

2. The possibility of shorter-term fluctuations in the consumption function— as over the course of the business cycle—also discussed by Samuelson, has been seized on by Woytinsky as the spearhead for his attack on the use of the function. According to Woytinsky,[28] consumers' expenditure patterns in prosperity di-

[24] Franco Modigliani, "Fluctuations in the Savings Ratio: A Problem in Economic Forecasting," unpublished paper prepared for Vol. X of the National Bureau of Economic Research, *Studies in Income and Wealth*, p. 3. Also W. S. Woytinsky, "What Was Wrong?" *op. cit.*, p. 147.

[25] Lord Keynes' literary presentation modifies the two-valuedness of his symbols. He mentions, in addition to the size of the community's income as a determinant of its consumption expenditures, "other objective attendant circumstances," "the subjective needs and the psychological propensities and habits of the individuals composing it and the principles on which the income is divided between them," and "real income." Keynes, *op. cit.*, p. 90 f. Fully aware of the instability problem, he also said that the consumption function was fairly stable "only in a 'given situation,' " i.e., in the very short run (*ibid.*, p. 95).

[26] Paul A. Samuelson, "Full Employment after the War," in S. E. Harris (ed.), *Postwar Economic Problems*, pp. 32–37. A drift in the opposite (downward) direction is implied in some stagnationist thought and writing.

[27] See Louis Paradiso, "Retail Sales and Consumer Incomes," *Survey of Current Business*, Oct. 1944, p. 13. For many individual commodities, the National Resources Committee had forecast consumption with income and time as the leading independent variables in 1939, but many of the functions used were more complex than Keynesian consumption functions and readers were warned against possible instability. National Resources Committee, *Consumer Expenditures in the United States*, Appendix C, pp. 153–195.

[28] Woytinsky, "Relationships," *op. cit.*, p. 2.

verge markedly from the patterns in depression. The marginal propensity to consume rises and falls with the tide of business activity. The statistical parameters of the consumption function differ, then, according as the climate of the economy is prosperous or depressed. The estimator must use his best judgement and make his choice, before using a consumption function, whether he will use a "prosperity" or a "depression" version. The post-V-J deflationists, using a model influenced predominantly by the data of the thirties, unwittingly assumed "depression" conditions, whereas a "prosperity" model, fitted only to the good years of the business cycle, would have yielded more satisfactory results in the boom situation which prevailed after the close of hostilities. In reply to this position, Klein has insisted,[29] correctly in my opinion, that a preliminary requirement for the forecaster to make a subjective selection between "prosperity" and "depression" models begs the basic question involved and is to that extent unscientific.

Other writers propose procedures which reduce in practice to inclusion among the independent variables of some expression for the cyclical position of disposable income instead of requiring a two-way choice between a "prosperity" and a "depression" hypothesis. The most elaborate development of this type has been suggested by Dr. Franco Modigliani, who sets up a "cyclical income index"[30] and concludes that the proportion of income saved will be positively related to and largely explained by it. Another suggestion, due to Irwin Friend of the Securities and Exchange Commission, is that if expenditures for residential housing are included in consumption (instead of capital formation, as is more usual), and if prices and population are used as deflators (as Modigliani has used them) the cyclical instability becomes negligible in importance.[31]

3. A related proposal due to Hart[32] is the inclusion of the rate of change of disposable income as an independent variable. Consumer behavior patterns, Hart insists, depend largely upon this factor. In reply, Dr. Jacob Mosak[33] refers to statistical computations by himself and his associates which indicated that omission of the rate-of-income-change factor in estimates testing the self-sustaining character of full employment yielded results not significantly different from those obtained by including it as a variable and then holding its value at zero. This answer, while meeting Hart's objection with regard to the type

[29] Klein, "A Post-Mortem," *op cit.*, p. 295.

[30] Modigliani, *op. cit.*, pp. 11–17. The "cyclical income index" is defined as follows (p. 11):

    "Let Y_t denote real income per capita in the year t and Y_t^0 denote the highest real income per capita realized in any year preceding t; ` . . the quantity $(Y_t - Y_t^0)/Y_t$ will be referred to as the 'cyclical income index.' "

[31] Irwin Friend, "Relationships Between Consumers' Expenditures, Savings, and Disposable Income," *Review of Economic Statistics*, Nov. 1946, pp. 210–212.

[32] Hart, " 'Model-Building' and Fiscal Policy," *op. cit.*, p. 533 f.

[33] J. L. Mosak, "National Budgets and National Policy," *American Economic Review*, March 1946, p. 41. Mosak's original estimates may be found in his article "Forecasting Postwar Demand: III," *Econometrica*, Jan. 1945, pp. 25–53.

of analysis Mosak himself was making, is hardly relevant in connection with forecasting problems, particularly for the short run.   For forecasting models in the strict sense, such "dynamic" systems as those of the Cowles Commission[34] have included past as well as current incomes among the independent variables of their consumption functions, thus going most of the way toward meeting Hart's suggestion.

4. Most estimators applied the consumption function to incomes and consumption expenditures in current prices, claiming that correlation coefficients for constant-price data were slightly lower algebraically.   On theoretical grounds, the use of deflated prices in periods of substantial price change is necessary to stability of the consumption function and has been recognized as such by writers from Keynes[35] on, Woytinsky being particularly caustic in his attacks on writers using current prices.   Dr. George Garvy of the Federal Reserve Bank of New York has suggested (in a letter to the writer) the explicit introduction of the price level (or its rate of change) as an additional independent variable in the consumption function, expecting high (and rising) prices to reduce greater expenditures for consumption from a given money income.   This would be a procedure alternative and not additional to price deflation.

5. Over periods of appreciable population change, there has been no objection to deflating the consumption function to per capita terms.   In addition, however, the distribution of the population between urban and rural areas has been put forth as an independent consumption determinant by Bean,[36] while Bassie[37] is the author of an ingenious suggestion that the apparent postwar shift in consumer buying habits from durables to nondurables, whose disconcerting effect has been remarked more than once, was associated with a growth in population.   In terms of the familiar "triads" of Hicks and Lange, Bassie would have us believe that babies are complementary with nondurable against durable consumer goods.

6. More in dispute is the effect of changes in the liquid asset holdings of individuals as an independent determinant of consumption patterns.   These holdings, consisting of government securities, bank deposits, and currency, have risen since 1939 from less than $50 billion to nearly $130 billion.[38]   An increase of this magnitude is an obvious possibility as an explanation for the post-V-J rise in consumption above estimates derived from the ordinary consumption

[34] See Klein, "Use of Econometric Models," *op. cit.*, equations (1.1) and (2.1), pp. 113, 122.

[35] Keynes' consumption function is presented as "the function which relates the consumption *in terms of wage-units* (C_w) to the income *in terms of wage-units* (Y_w)." *Op. cit.*, p. 90.   (Italics mine.)

[36] Bean, *op. cit.*, p. 200.

[37] Bassie, *op. cit.*, pp. 118–121.

[38] For the war and postwar rise in the liquid asset holdings of individuals (including noncorporate business establishments), see two unsigned articles in the *Federal Reserve Bulletin*, "Liquid Asset Holdings of Individuals and Businesses," *op. cit.*, June 1945, p. 533, and "Slackened Growth in Liquid Assets," *ibid.*, Nov. 1946, p. 1221 f.

function, and leads to the inference that the liquid asset volume should be included as an independent variable in this function.

The position of the defenders of the consumption function remains essentially that of Mosak and Salant,[39] who, defending the effectiveness of wartime direct controls against Warburton's rehabilitation of a strict quantity theory of money, pointed out the lack of statistical evidence of any effect of liquid asset changes on the consumption function during the thirties, when the increases, though small as compared to those of wartime, were large by previous standards. Klein[40] repeats this point of view, utilizing the high concentration of liquid asset holdings (other than currency) found by the Bureau of Agricultural Economics-Federal Reserve Board liquid assets survey[41] as evidence minimizing the importance of liquid assets in explanation for the 1945–46 anomaly. The opposite position has been presented with skepticism and moderation by Sapir,[42] and the results can only be written off as inconclusive.

More extensive lists of possible independent variables, some of them appearing quite farfetched (at the present time) or unsusceptible to accurate quantitative measurement, have been presented by several writers.[43] As every tyro statistician should know, complaisant proliferation of independent variables is no solution for the difficulty. Not only does the difficulty of computation increase in something like geometric proportion, but—and herein lies the justification for this statistical Occam's Razor—the increase of the number of independent variables used results in a corresponding loss of statistical degrees of freedom. When the number of observations used as basic data is relatively small, as here, the loss of degrees of freedom serves in itself to bring about precisely the instability which the proliferation of variables was designed initially to correct. The dilemma is sharpened if, as here, certain of the "independent" variables may be so highly intercorrelated in fact under normal conditions as to make their combined regression largely meaningless by reason of "multi-collinearity." Pro-

[39] Jacob Mosak and Walter Salant, "Income, Money, and Prices in Wartime," *American Economic Review*, Dec. 1944, pp. 828–37.

[40] Klein, "A Post-Mortem," *op. cit.*, pp. 296–98. In his *Keynesian Revolution*, however, Klein apparently modifies his position materially. "It may be true, in the postwar world," he tells us on page 61, "that a large amount of liquid assets in the hands of individuals, *coupled with a dearth of durable consumer goods*, will have a great influence on the propensity to consume. But this is not to be expected as a normal peacetime relationship." (Italics Klein's.) Again at page 163, we read: "The prevention of inflation for any number of years does not insure against the dumping of accumulated funds all at once on the market at a time when output is not sufficiently expansible to counteract spiraling price increases."

[41] The pertinent aspects of this survey are found in Henry H. Villard, "A National Survey of Liquid Assets," *Federal Reserve Bulletin*, June and July 1946, pp. 574 f., 716–22. Results of a second survey in February 1947 indicate no great change in concentration. See Duncan McC. Holthausen, "Survey of Consumer Finances," *ibid.*, June and July 1947, pp. 653–55, 789–802.

[42] Sapir, *op. cit.*, pp. 28–30.

[43] Cf. George Katona and Rensis Likert, "Relation Between Consumer Expenditures and Savings: The Contribution of Survey Research," *Review of Economic Statistics*, Nov. 1946, p. 198 f.; Hart, " ' Model-Building,' " *op. cit.*, p. 544; and Friend, *op. cit.*, p. 215.

liferation is not the answer. There must be a choice, and the correct choice for one period may be quite wrong for another.[44]

Even with a "correct" choice for the long run, with neither too many autonomous variables nor too few, sudden discontinuous changes in consumer buying habits may make (expanded) consumption functions unreliable in critical short-run situations. The end of the war, with its consequent release of patriotic tension, may have been just such a case. Several authors[45] speak of a sudden postwar "spending spree"; somewhat later, the retention of rent controls after the demise of general price regulation may have had a similar effect.[46] If the short period is marked by limitations in supply, consumption as a whole may become an "autonomous" or "exogenous" variable, not determined in accordance with any consumption function whatever, like durable goods consumption in the post-V-J period. If this is true and relevant, the value of the consumption function for forecasting is limited at best to long-run tendencies and uneventful "normal" short-term movements.

<center>V</center>

For all the statistical convenience of its calculation, there is nothing theoretically sacred about the linear form in which the consumption function is ordinarily fitted. A linear function yields a constant value for the marginal propensity to consume, whereas there is no positive reason to discard a priori the possibility of its varying with the community's real income level, even at a given stage of the business cycle. In fact, a downward concavity of the consumption function (marginal propensity falling as income increases) has been proposed on theoretical grounds by Sapir.[47] Use of the savings ratio S/Y or $(Y-C)/Y$ as a dependent variable in a linear relation, which also implies a concave consumption function, has been the practice of writers with viewpoints as diverse as the Keynesian Kalecki and the anti-Keynesian Woytinsky,[48] although Klein[49] has objected to

[44] Dr. Haavelmo's discussion of "The Degree of Permanence of Economic Laws," comprising pp. 12–39 of his "Probabilty Approach in Econometrics" is definitely in point here, the most pertinent passage being found at page 26: "Frequently, our greatest difficulty in economic research does *not* lie in establishing simple relations . . ., but rather in the fact that the observable relations, over certain time intervals, *appear to be still simpler* than we expect them to be from theory so that we are led to *throw away* elements of a theory that would be sufficient to explain apparent 'breaks in structure' later." (Italics Haavelmo's.)

[45] For example Sapir, *op. cit.*, pp. 24–26.

[46] I owe this suggestion to Dr. W. W. Tongue of the Jewel Tea Company, my former colleague at the Federal Reserve Bank of Chicago.

[47] Sapir, *op. cit.*, p. 27. Klein ("A Post-Mortem," *op. cit.*, p. 294) insists that any curvature in the historical relationship lacks statistical significance.

[48] Michal Kalecki, "The Maintenance of Full Employment after the Transition Period: A Comparison of the Problem in the United States and the United Kingdom," *International Labour Review*, Nov. 1945, p. 457 f., and public lectures, University of Chicago, March 1946; Woytinsky, "Relationships", *op. cit.*, p. 7. See also Modigliani, *op. cit.*, *passim*, and particularly the conclusion arrived at from Canadian and Swedish as well as American data (p. 35): "The extrapolation of the simple regression equation of consumption on income is entirely misleading and seriously underestimates the future of consumption; . . . in the long run the savings ratio tends to fluctuate very slowly if at all."

[49] Klein, "A Post-Mortem," *op. cit.*, p. 294 f.

the consequent elimination of any constant term from the estimate of savings. (If S/Y is a linear function of Y, S becomes quadratic in Y with a zero constant term.)

<div style="text-align:center">VI</div>

The theoretical consumption function relates total consumption to total income. In framing the post-V-J forecasts, the usual (although not the universal) practice was to fit separate functions for consumption of different classes of goods, and then add the results to a final estimate of total consumption expenditures. In considering the justifiability of this modification, we become involved in a complex of issues known in econometric circles as an *aggregation* problem.

A principal thesis of Klein's "Post-Mortem" pertains to this problem. According to his view, consumption should have been estimated as a single entity despite the complicating effects of shortages. This procedure, in view of the economic conditions of the period, is tantamount to expecting consumers to reduce their savings to the peacetime normal and spend on nondurables in abnormal volume as a result of the shortage of durables.[50] The economic meaning of the alternative assumption actually used by Hagen and others was to anticipate consumers' continuing to save on the war pattern while awaiting the reappearance of the durables.

The fractional or compound approach of Hagen and the others has the advantage of lessening the probability of major *statistical* errors of a random character, since the multiplication of estimates increases the probability of their canceling each other out at least in part. On the other hand, major *economic* errors may be introduced by insufficient aggregation. The relative "prices" of the different types of goods are not considered; in the case at hand here, the raising of the effective price of automobiles and refrigerators to infinity is not taken into account. There is furthermore, as Klein[51] points out, no reason to expect the theoretical relation between income and consumption as a whole to hold with equal stability between income and any subclass of consumption expenditures.

Writers who grant the error of insufficient aggregation differ in essaying its quantitative importance for the post-V-J forecasts. On the basis of unpublished forecasts by Haavelmo, Mosak, and himself, Klein[52] ascribes to this one factor the great bulk of the deviation between computed and actual values. His critics, including particularly Woytinsky,[53] take a contrary position. In the

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[50] Hagen, "Reflections of a Forecaster," *op. cit.*, p. 99, points out another assumption—the ability of nondurable goods industries to produce at the levels required—which he personally would not have cared to make until "shown" by the actual course of events.

[51] Klein, "A Post-Mortem," *op. cit.*, pp. 299–302. Tongue's suggestion on the effect of rent controls (see above, note 45) also applies here.

[52] Klein, *ibid.*, p. 298: "*If the Washington economists had used the total consumption function fitted to the data for 1929–41, they would have been nearly correct in their forecasts for the fourth quarter of 1945.*" (Italics Klein's.)

[53] Woytinsky, "What Was Wrong?" *op. cit.*, p. 142 f.

most detailed statistical study yet conducted on the point, Sapir [54] has isolated the effect of insufficient aggregation on the Hagen forecast, and concludes that approximately 50 per cent of the deviations are accounted for thereby. His preliminary figures are reproduced as Table 2.

VII

It is difficult to assess the merits of a controversy which is still in progress, when every passing month or quarter adds additional participants or additional contributions from recognized principals. Under such circumstances, indeed, any assessment is a progress report including a tentative and qualitative forecast of the probable outcome.

It seems unsafe to use elementary (2–3 variable) consumption functions as forecasters, either by themselves or as parts of economic models so simple (including so few equations) as (3–8). Too many other variables may be important, which cannot be included without losing too great a number of degrees of free-

TABLE 2

Effect of insufficient aggregation on Hagen's projections of major economic factors, 4th quarter 1945 and 1st quarter 1946

	4TH QUARTER 1945			1ST QUARTER 1946		
	Gross National Product	Disposable Income	Consumption	Gross National Product	Disposable Income	Consumption
	(*Billions of dollars*)					
Actual Data..................	185.2	136.9	113.0	180.6	138.0	120.2
Hagen Projection.............	164.6	119.9	96.2	161.8	120.9	99.5
Hagen Projection, with Total Consumption Function......	177	126	109	170	125	108

dom. Instability is the consequence whether these "other variables" are excluded or included, and whether their inclusion does or does not involve a simultaneous increase in the number of equations in the model. The danger is particularly great in the case of short-run forecasts with their additional (temporary) unstable features. The model-builders themselves realize this point; the error-margins of their forecasts are large when they compute them,[55] but as they point out unfailingly, the underlying problems are not solved but ignored by conventional "qualitative" forecasts of the crystal ball and armchair varieties.

If time and staff are available, econometric analysis, with consumption

[54] Sapir, *op. cit.*, p. 18.

[55] Thus, e.g. Klein, "Use of Econometric Models," *op. cit.*, p. 134, estimated at only 70 per cent the probability that gross national product for fiscal 1947 would fall within $13 billion of his projected value of $177.5 billion, without allowing, so far as I can see, for unavoidable mistakes in forecasting remaining exogenous factors like government spending. The $26 billion range extends from a major depression at its low end to close to the present (summer 1947) boom level at its high one.

functions playing a prominent role, is worth attempting, if only as a rough check on the consistency of whatever other estimates are made. Econometric tests should prevent completely the combining of such forecasts as, say, a $200-billion gross national product with a prewar price level and 10 million unemployed. This is a real service; it is a rare forecaster who never slips into an inconsistency, even if the discrepancies are seldom so glaring as in the hypothetical example just given. Problems of time and staff are important not only because of the specialized skill required to carry out the computations for econometric models but because time and effort spent in econometric research must be taken in some part from time and effort devoted to amassing qualitative information and acquiring the "feel" of particular situations. There is an optimum rate of substitution between qualitative and quantitative forecasting work. It is not the matter of simple addition implied by Klein in the statement:[55]

"The nonstatistical economist has only qualitative information from which to make judgments. The statistical economist has *this same qualitative information* plus a thorough knowledge of historically developed behavior patterns." (Italics mine.)

A few technical conclusions also emerge from the welter of controversy regarding the function:

1. *Total aggregative* consumption functions should be fitted, and sectional functions used, only after prolonged deliberation.

2. Additional independent variables should be added to consumption function formulas, even at the sacrifice of degrees of freedom, to observe the extent to which their inclusion alters the results.

3. Some formulas should be fitted, particularly when outside the range of historical experience, which do not by their very form assume a fixed marginal propensity to consume.

4. If the price level and population are not among the variables to be determined by the econometric model system, deflation for price and population changes will improve the accuracy of the forecasts.

5. Formulas which do not back-cast well for periods prior to 1920 should be used only with extreme caution.

[55] Klein, *ibid.*, p. 111.

COMMUNICATION

To the Editors:

In your issue of July 1947, the review of *Can Science Save Us?* makes the following statement: "He [the author] asks us (p. 6) merely to wait until we have a perfected social science. . . ." I submit that I have not anywhere in the book under review, or elsewhere, advocated "waiting" for science to develop. On the contrary, it is the main thesis of the book in question that only through extensive, arduous, and prolonged research, as in the case of the physical sciences, can we expect the social sciences to reach a comparable development (pp. 23, 24, 49, 50, 115). Yet, the reviewer asks, "How do we get to that stage?" Indeed, he asks, "How does this differ from the solution of the minister who says, 'Love thy neighbor,' or the statesman who solves Europe's misery by saying 'All we need to do is unite'?" Does the reviewer seriously mean that he sees no significant difference between the scientist's advice, when he advocates serious and comprehensive research on cancer, and the advice of a salesman who advocates snake oil as a remedy? The reviewer correctly says that I advocate putting our faith in the methods of science in our approach to our social, as well as our physical problems. I concretely specify what that method is (p. 67) and what its application involves (pp. 42–46, 115). I believe there is a detectable difference between this advice and the mere statement, "All we need to do is to unite." To be sure, "the vast forces that determine the course of evolution" are not "brought under control" by the mere decision to use the scientific approach or even by the full development of the necessary scientific knowledge. Did the reviewer expect me, in a book of 120 pages, to present in advance the detailed results of the necessary research which the book advocates, as well as engineering details for "bringing the course of social evolution under control"?

The reviewer further implies that I have said that the social sciences "do, would, or could flourish *equally well* under *any* type of social organization" [italics mine]. The statement is absurd on its face and I have, of course, never said anything of the sort. I did point out, as any student of the history of science can verify for himself, that science has flourished under *a great variety* of forms of *political* and *economic* organization. The question of what would be the most avantageous form of social organization for the social sciences or for the satisfaction of the "universal wants of men" is a proper subject for scientific investigation, not for ethnocentric and chauvinistic declaration of belief. Finally, I have nowhere said that scientists should be indifferent to the ideological issues of our time. I have merely said that their personal preferences on matters of this kind should not be confused with scientific findings.

University of Washington   GEORGE A. LUNDBERG

BOOK REVIEWS

America's Needs and Resources. By J. Frederic Dewhurst & Associates. New York: The Twentieth Century Fund, 1947. Pp. xxviii, 812. $5.00.

If to foresee, rather than to understand, is the purpose of science, the publication of this volume should bring economics one step closer to the status of a science. The authors review what has happened in the past only to use that review to provide material for predictions of what can take place in the future. The report estimates for 1950 and 1960 the demands and needs in the United States for all types of consumer goods and services and capital goods at assumed high levels of employment, production, and income. Furthermore, it attempts to discover whether or not the nation's labor force, its natural resources, and its capital equipment can meet these demands and needs.

The study was begun early in 1943, at which time the contributors were asked to accept the basic assumption that "the war will end in 1945 with Japan's defeat coming after Germany's and with the peak of our industrial war effort being attained at some time in the 1944–45 period." The completion of a study of this size in the period elapsing between 1943 and what was obviously a date well before the May 1947 publication is, as the director of the Twentieth Century Fund states in the preface, a tribute to the "hard, meticulous, constant effort" of the staff. In addition to writing four of the five summary chapters, J. Frederic Dewhurst, research director and editor, also wrote six more on such diverse topics as the war potential, religion and welfare, and foreign trade to bring the total he authored to ten of the 26 chapters. The assistant research director, A. Benjamin Handler, was responsible for three. In addition, special chapters were written by W. O. Woytinski on population trends, by Faith M. Williams on clothing and personal care, by Louis Weiner on household operation, by Wilford Owen on consumer transportation, by Margaret C. Klem and Helen Hollingsworth on medical care, by William C. Carr on education, and on other topics by others. The work of the staff, despite this assistance, is found in all chapters. The staff was responsible for the estimates of gross national product and national income to which estimates of the various components of consumption and production are tied. So far as the reviewer was able to determine, there are no inconsistencies in the estimates from chapter to chapter.

But despite the meticulous care and effort of any research staff, a volume of this size certainly could not have been compiled without the enormous strides made in economic measurements during recent years, especially in measurement of income, consumption, and production. Neither would the unity of the volume have been possible without developments that have taken place in what some have called the macromatic approach. Neither the statistical materials nor the statistical concepts would have been available, for instance, had such a study been started during World War I. The first volume of the National Bureau of Economic Research series on income did not appear until 1921. The gross national product series was not currently released until 1942. The contrast be-

tween this study and one appearing only 18 years ago can be noted by examining *Recent Economic Changes*, the report prepared by the Hoover Committee. The gathering of the statistical materials by the staff was, therefore, not essentially a mining process. It has used materials already published for the most part, or if not published, at least compiled by other persons. The staff acted as forecasters and not as observers.

The director of the Twentieth Century Fund believes that the study will prove very useful as a source book to such persons as "the educator, the clothing manufacturer, the wheat farmer, the Federal Reserve Board member, the labor unionist, the senator from this state or that, the President himself, as well as the average citizen." Certainly there is no lack of statistical data. The volume contains 225 tables in the body of the text and the appendixes covering 97 pages are devoted entirely to tables and descriptions of the tables.

The preoccupation with economic "facts" has not resulted in easy reading. There are few pages without some type of statistics. The average citizen will find the reading of the book hard going.

Estimates were made first on an aggregate basis. The standard of measurement for both past performance and for the possible future performance and needs of the American economy is dollars of constant purchasing power and the key is the gross national product. The GNP for either 1950 or 1960 is dependent upon these things according to the study: the number of persons in the labor force, the average number actually at work, the average hours of work, and the average output per man-hour.

By 1950 it is assumed that the transitions from a wartime to a peacetime economy will have been completed, including the satisfaction of pent-up demands for consumer goods except houses, and that most wartime controls will be eliminated. Under these assumptions the staff proceeds to estimate the size of the gross national product in 1950–1960 under conditions of "stable prosperity and high levels of employment." The war period was discarded as a possible pattern for such conditions because it was a distorted one. Instead the period from 1925 to 1929 was chosen.

The year 1950 will find the country with a labor force of 60.5 million persons and 1960 with a labor force of 63.4 million. The closest approximations to reality according to the authors as to the future number of inhabitants are found in the Thompson-Whelpton projections made in 1940, which assume high fertility and medium mortality. As to unemployment, an average of 5 per cent of the total labor force is assumed. The average standard work week expressed as a weighted average for both agricultural and nonagricultural employment will fall from 45.4 hours for 1940 to 42.5 hours in 1950 and to 39.7 hours in 1960.

Labor productivity is estimated in terms of national income per hour per worker. On the basis of decennial data since 1850, it is assumed that the 18.2 per cent increase per decade will continue into 1950 and 1960. This will bring the net output per man-hour in 1940 prices from 79.3 cents in 1944 to 87.5 cents in 1950 and $1.034 in 1960.

Given these estimates it is relatively easy to project national income. For

example, with 57 million employed for 40.8 hours per week producing at a rate of 87.5 cents, the amount of the national income would be approximately $106 billion at 1940 prices or $140 billion at 1944 prices. The projection for 1960 would be $161 billion at 1944 prices. Disposable income in 1950 and 1960 is estimated at $128 billion in 1950 and $148 billion in 1960 at 1944 prices, after having taken into consideration possible government expenditures and personal taxes.

From these national income figures, estimates of GNP are derived by assuming a continuation of the relationships existing between national income and GNP in the years 1929, 1940, and 1941. These years "provide the only satisfactory picture of prewar income-expenditure relationships under fairly active peacetime conditions." Consumer expenditures will amount to $116 billion in 1950 and $134 billion in 1960. Although these estimated figures represent what the authors term a "handsome advance" over the performance of the best prewar years and double that of the depression years, the gain in per capita income will not be at as great a rate. Because of the increase in population, per capita income in 1960 will amount to only $1,030 compared with $860 in 1941 and $1,140 in 1944 at 1944 prices.

The distinction between a "prediction" and an "estimate" is a fine one. Nevertheless, the authors state that the data for 1950 and 1960 are "in no sense predictions." They are "intended to represent a judgment in terms of employment, working hours, output, and expenditures in 1950 and 1960 if our economy is operating at a high level of activity in those years." But even on this basis there are considerable differences from estimates made by others. For the most part the GNP estimates in the present volume are lower than those made by most other estimators. The estimate for 1950, as nearly as it can be adjusted to a comparable basis at 1944 prices, for example, of R. G. Allen is $204 billion; that of Louis H. Bean, $200 billion; Henry A. Wallace, $194 billion. The chief reasons listed for such differences are the varying opinions about future labor productivity.

Given this frame of reference concerning the size of the GNP and consumption expenditures, the next step taken was that of determining the consumption expenditures for individual types of products and services. Estimates made by Lough, the National Bureau of Economic Research, the Department of Commerce, and others of expenditures beginning with 1909 are studied for trends. The estimates of 61 types of consumption goods and service expenditures for 1950 and 1960 are derived first by extrapolating from correlations made between the individual types of expenditures and disposable income for past years. These items are then grouped and individually compared with estimates made by extending secular trends, and adjustments are made where necessary.

As a result of these estimates, it is possible for the reader to learn how much consumers are expected to spend in 1950 and 1960 for such major items of consumption as food, liquor, and tobacco, which it is estimated will amount to 30.98 per cent of total consumption expenditures in 1960 and for such minor items as foundations, museums, and libraries, for which expenditures are expected to

amount to only .08 per cent of the total. Expenditures for food, liquor and tobacco; clothing, accessories and personal care; housing; and religion and social welfare are expected to decline in importance. Greater importance is expected in expenditures for household equipment and operation; consumer transportation; medical care, insurance and death expenses; recreation; and private education.

One or more chapters are devoted to surveying each of these major components of consumption expenditures. The pattern is much the same from chapter to chapter. In the chapter on medical care, for example, Margaret C. Klem and Helen Hollingsworth begin with a survey of past practices and facilities followed by a survey of the nation's health and a discussion of income and cost. Probable future expenditures are then determined on the basis of the assumed levels of income in 1950 and 1960 and these in turn are compared with the cost of adequate medical care. Thus, for 1950, probable expenditures, which are called "demands," are estimated at $4.7 billion, while needs are estimated at $5.9 billion, both at 1944 prices. Consumption needs of all types together will exceed expected demands for consumption goods and services by $13 billion in 1950 and $10 billion in 1960.

The authors recognize that they are on tricky ground when they attempt to estimate needs. They realize that even if the income were available there is no assurance that it would be spent so as to provide adequate medical care rather than more cigarettes or liquor, for example. Their solution has been to certify as needs only those expenditures necessary to raise the level of living of those persons whose incomes are so low that it is impossible for them to purchase those goods and services considered essential by various authorities.

Past trends and relationships were found to be unreliable as guides for estimating expenditures for capital goods. Especially in recent years capital expenditures have been subject to violent fluctuations from year to year. The long-term relationship for the years 1879–1938 provided the best guide. The final result was to place total capital outlays at $27.7 billion in 1950 and $33.0 billion in 1960, about 16 per cent of GNP. The 27 individual components were derived by use of the trend of ratios to total expenditures and independent judgment.

Against these probable "demands" for capital goods, what are the probable "needs"? The chapters devoted to analyzing consumption expenditures already had partially answered this question. Special chapters on urban redevelopment and rural and regional development explore these needs further. All together, at 1944 prices, needs for capital expenditures are placed at $34.5 billion against the possible demand of $27.7 billion and in 1960 at $37.9 billion against $33.0 billion.

The grand total of estimated needs, consumer expenditures, capital goods expenditures, government expenditures, and inventory changes and export balances total $202.4 billion for 1950 at 1944 prices and $218.8 billion for 1960, sums exceeding GNP by $23.2 billion and $16.8 billion respectively.

Are the resources of the American economy capable of meeting either the prospective demands or needs? Some of the answers of the survey are as follows:

As to the labor force, "We can greatly surpass normal output under pressure of necessity"—a GNP of $240 billion in 1960 against an assumed normal of $177 billion—but, the " 'reserve labor capacity' . . . can be drawn into use only gradually and by means of increasing incentives and pressures." As to natural resources, "Heavy wartime demands weakened our position by hastening the depletion of our best reserves of a number of important industrial raw materials. . . . Given a system that permits free access to the world's resources, however, there can be no question of a raw material supply adequate to support an expanding American economy . . . And even if we shall be forced to rely on our domestic mineral deposits to a much greater extent, . . . no reason exists for believing that depletion is so extensive that it would necessarily become a serious barrier." As to agriculture, "There appears to be no material obstacle in prospect for achieving an agricultural program in 1950–1960 sufficient to meet adequate food and fiber requirements for both domestic and foreign markets." Finally, as to industrial capacity, "We have reached the stage in economic development and technical competence where inadequate industrial and commercial capacity can be quickly overcome through the construction of new facilities . . . .The real dangers are an inadequate level of income and a low standard of living."

Such, in barest outline, is the story told by this vast exercise in arithmetic. Certainly there are some that would consider the answer incorrect. Changed methods of arithmetic involved in the recent revision of national income and product statistics by the Department of Commerce will make the checking of the estimates by performance difficult although not impossible. At 1944 prices the GNP in 1946 according to the revised series was $183 billion and even on the basis of the old series was less than a billion dollars lower than the $177 billion estimate for 1950. More criticisms on the part of prognosticators will, however, arise perhaps from the methods used in making the aggregate estimates than in the correctness of the estimates. To be wrong has been the privilege of most economic forecasters in recent months.

The aggregate estimates are not more reliable than other estimates because of the mass of statistics contained in the volume. The detailed breakdowns are byproducts of the estimates of GNP, not the foundation for them. Unless the assumptions or methods are better, no more reliance can be placed upon the aggregates or their components as the possible measurements of the economy at full employment than on those made by other persons whose breakdowns are less detailed.

The description of this study has made it apparent that the methods used differ markedly from those used by many other model builders. Nothing is said of the consumption function so popular in postwar forecasting, especially among the followers of Keynes. Nothing is said of the propensity to consume, investment in the Keynesian sense, or the multiplier. No answers are found to questions about whether or not the structure of the economy is capable of sustaining itself. The study, therefore, does not, as the press release for the volume states, prove that "far from being 'mature,' or 'dead,' the American economic system is a dynamic, growing thing," although no such claims are found within the volume.

The lack of needs has not been the basis for the mature economy thesis. Rather it has been that the structure of the economy was such that automatic private investment in the long run would be insufficient to sustain levels of full employment. The "educator, the clothing manufacturer, the wheat farmer, the Federal Reserve Board member, the labor unionist, the senator from this state or that, the President himself, as well as the average citizen" must look elsewhere for an answer.

What they will find is a carefully compiled record of what has happened in the past but not a reliable guide to the future. One who follows through the many assumptions, adjustments, and speculations required to compile even a record of the past may conclude that economics is far from obtaining that requisite set for science by Reconte du Nauÿ as essential for prediction: "Facts, objects, and phenomena must be described minutely and joined together in scientific laws." They may even conclude that it is an impossibility to do so and agree with the authors of this study that whether or not further progress takes place will be determined by "a multitude of actions and decisions on the part of individuals" and not by any automatic mechanism.

Federal Reserve Bank of Atlanta   CHARLES T. TAYLOR

Economic History of the American People. By Ernest L. Bogart and Donald L. Kemmerer. Second edition. New York: Longman's, Green & Co., 1947. Pp. viii, 856. $4.50.

This revision of the 1942 edition of this well-known text is as much one of proportion and emphasis as it is of content. Less emphasis is placed on the economic development of the United States prior to 1860 and more space is devoted to the era following World War I.

The trust movement is interpreted in terms of "an industrial monopoly operating over a wide market." Nation-wide transportation facilities and an increasing proportion of fixed cost to total cost stimulated cutthroat competition. It was in an effort to escape from the hazards of falling prices and from unstable prices that combinations occurred in such large numbers following the close of the Civil War.

Social progress since 1860 is described in terms of increasing social control and the disappearance of rugged individualism.

Wars are financed by means of taxation, borrowing, and by creating money. In spite of large increases in income tax rates and the use of other taxes, World War I was financed by something less than 33 per cent by taxes; World War II, 31 per cent. Probably 25 per cent of the cost of each war was met by creating new money, largely in the form of bank deposits; while approximately 44 per cent of the cost of each war was raised by the sale of bonds. Since World War II lasted over twice as long as World War I this record may be commendable. Progress was made in World War II in controlling the inflationary spiral through the activities of the Office of Price Administration and of the National War Labor Board.

The several steps by which the United States assumed leadership of the

Western Hemisphere culminated in the good will policy of Franklin D. Roosevelt. Military bases have been acquired in the Pacific; and commitments in Europe and the Far East have forced recognition of the United States as a world power by foreign countries.

Those who prefer a somewhat statistical approach to a study of the economic development of the United States will find this text to their liking.

University of Florida   FRANK W. TUTTLE

Or Forfeit Freedom. By Robert Wood Johnson. New York: Doubleday & Co., 1947. Pp. x, 271. $2.50.

This book deals chiefly with labor relations. ` In substance it follows the tradition of such writers as Mayo, Barnard, and Whitehead. Unlike their writings, however, it is done in popular style. The author explains that the book is meant to do a practical job and "is neither a compendium nor a scholarly treatise."

In the author's view, the system of private enterprise is foundering. Business is held in low esteem by the public. This is not a new development; business has been sinking to its present low level for generations. It finds itself in its present sorry state largely because of adherence to the fallacious and antisocial tenets of classical economics.

The author, who is chairman of the board of Johnson and Johnson, believes that the solution to the grave problem of saving private enterprise lies in stressing the social and moral aspects of management's dealings with consumers and workers. As a starting point in this new approach, he formulates a statement of the responsibilities of business. The first responsibility of business is to its customers. Its second responsibility is to its workers. This is the responsibility to pay fair and adequate wages, enhance the worker's sense of security, provide good working conditions, and generally recognize the importance and dignity of the individual as a human being. The third responsibility of business is to its management. And its final responsibility is to the owners and stockholders. He conceives the final responsibility to be residual. This is made clear when he states that "only if the other three have been met, or plainly can be met, is it worth while to consider the future of any business enterprise or ask what it should receive."

The way in which to carry out the responsibility of business to the consumer is seemingly simple, although it can scarcely be expected that it will have a popular appeal to the business community. We must have widespread acceptance of a philosophy of business which will "concentrate upon value and service and relegate such items as profit to their proper and secondary place."

The author's suggestions for implementing the responsibility of business to the worker are somewhat more detailed and specific. Some of the more important of these suggestions may be condensed as follows: (1) dignity must be given to every job; (2) craftsmanship must be restored to its rightful place; (3) wherever possible, incentives must be placed on a group basis; (4) workers must be given more information about company policies, problems, hopes, fears, aspirations;

(5) workers must be given a larger share in management; (6) training programs must be developed which are aimed at all levels—from top management to rank-and-file workers; (7) union leadership must be better trained in such a way as to develop professional competency and understanding; (8) management must accept the fact of unionism as a permanent institution and must learn to deal more intelligently with union leaders; and (9) excessively large plants must be decentralized in order to reduce the "dehumanizing" influence of sheer bigness in industry.

This book makes a contribution. In simple, understandable language, it attacks the fundamental rather than superficial issues involved in the steady deterioration of human relations in industry.

University of Alabama LANGSTON T. HAWLEY

Personnel Management. By Michael J. Jucius. Chicago: Richard D. Irwin, 1947. Pp. xii, 696. $5.00.

Those who are either teaching or working in the field of personnel management should appreciate this contribution to the literature in the form of a text-book. It brings to the user many interesting and useful tips and a mass of valuable procedure and detail.

The author's approach is clear, concise, and direct. His point of view is restricted to that of management, without much regard for, and very little emphasis on, the social or economic points of view, or even that of the labor unions. A lot of the descriptive material and indoctrination material commonly found in personnel texts is very obviously missing.

The coverage is good. Professor Jucius has developed some interesting divisions of subject matter and emphasis in his treatment. Probably the strongest characteristic of this text is that of "balance." Too often textbook writers project into their works their own personal bias and particular likes and dislikes. There is very little of that in this text. The author has divided the work of personnel management into distinct functions or problems and has presented various practices, procedures, forms, charts, and other data to substantiate his recommendations.

The greatest weakness of the book is that too much reliance has been placed on lists of steps in procedure, various personnel forms and instructions for use, and examples and illustrations of personnel practice to carry the weight that a text is usually required to carry in an organized course in personnel management or an industrial training program. As Dr. Jucius points out in his preface, this text will require some very fine teaching if it is to be used in college courses. A teacher who was not exceptionally well versed in the literature of economics and industrial relations as well as personnel management would probably have a very unhappy experience in trying to use this text.

The reviewer would recommend this text very highly in schools where the student is required to take other courses in labor economics, industrial relations, and other management courses, and where the particular course is organized to describe the practices and procedures of personnel management without too

great emphasis on the principles of scientific personnel management. This treatise would also serve as a valuable reference to supplement other texts which deal largely in principles and general procedures and practices of personnel management.

North Carolina State College,
University of North Carolina   T. W. WOOD

Measurement of Consumer Interest. Edited by C. West Churchman, Russell L. Ackoff, and Murray Wax. Philadelphia: University of Pennsylvania Press, 1947. Pp. vi, 214. $3.50.

This book contains a more or less complete summary of the formal papers and discussion panels offered at the Conference on Experimental Method which was sponsored by the University of Pennsylvania in May 1946. The broad purpose of this conference as stated in the introduction was "to make all fields of research more self-conscious, to accomplish a better understanding of method [and] to determine the most fruitful steps to be taken toward making research scientific," although the special attention of the conference was focused on the measurement of consumer interest.

As frequently is the case with a symposium of this nature, the book in hand suffers from a certain desultory quality, and it is not unblemished with adumbrations which smack of superficiality. Most of the material will not interest "theoretical" statisticians, but frankly is concerned with such "practical" problems as the avoidance of bias in stratified samples of consumer interest, wherein few generalizations are possible as each survey presents more or less unique problems.

Professor L. L. Thurstone is responsible for one of the few papers which might qualify as original contributions to theory. His subject is "The Prediction of Choice," and among other things Professor Thurstone deduces that "in the case of a threatened tie between two leading candidates, the more variable [with respect to the affections of voters] of the two candidates can win the election by introducing a less popular candidate." In another paper entitled "The Cornell Technique for Scale Analysis" Louis Guttman defined a "scalable" population as one for which "it is possible to rank the people from high to low in such fashion that from a person's rank alone we can reproduce his response to each of the items in a simple fashion."

Most of the other papers are concerned with such commonplace but eminently practical considerations as these: how to ask the question; how to determine the proper factors of stratification; how to cut the cost of interviews and "callbacks," etc.

But to this reviewer the most important and at the same time the most edifying part of the book is to be found in C. West Churchman's attempt to differentiate "consumer goods" from "producer goods" in order to identify that elusive but ubiquitous gentleman, "the consumer." After an acute and searching analysis Churchman finally gives up the attempt to distinguish between "consumer goods" and "producer goods." He then tries to define a consumer without

reference to goods categories. He emerges with this gem of obliquity: "An individual is said to be a consumer of an object of production X, if he employs it for a purpose different from the purpose of production."

University of Florida   MONTGOMERY D. ANDERSON

Public Utility Regulation. By Herman H. Trachsel. Chicago: Richard D. Irwin, Inc., 1947. Pp. 538. $5.00.

At first glance this volume by Professor Trachsel offers nothing startling in the organization of a text for an undergraduate course in the regulation of public utilities. The book is divided into the usual four parts—discussing first the nature of a public utility and then a consideration of the various agencies of control encompassing the municipal, state, and federal levels of government. These two sections are followed by an investigation of the administrative problems involved in public utility regulation. Lastly, certain special problems concerning electric power production and generation are presented.

While the general organization of the book is traditional, the author presents his material in a clear and readable fashion, using quotations from leading cases and authorities for illustrative purposes to a greater extent than do some other texts. All of the usual problems of valuation, rate of return, accounting and reporting, and holding company regulation are presented but emphasis is given to present-day problems and practices. "Prudent investment" as a determinant of the rate base, for example, is treated cursorily by some authors, but Professor Trachsel devotes a chapter to this important principle of public utility valuation, quoting extensively from Mr. Justice Brandeis' famous argument. The difficult problem of depreciation as it relates to valuation is explained clearly with the use of cases as source material. The chapter on rate structures explains adequately the relationship of costs to the rate structure as well as the more common rate forms. The description of multiple-purpose publicly owned projects and especially that of the Tennessee Valley Authority is well done. Rural electrification is considered at some length and the decline of municipal ownership is described.

Two omissions in this book may detract from its use as a text. One of these is the lack of a bibliography either at chapter end or elsewhere. Neither is there a list of cases used in the text and other cases of interest. The latter may be offset by the copious quotation from and reference to what appears to be all the leading cases pertinent to utilities regulation, but the omission of the bibliography may be a handicap to instructors who use this means to assign additional work to students. But all in all, the publisher's blurb that "the volume is clearly written for maximum teachability" sums up the reviewer's opinion.

University of Mississippi   CLARENCE E. KUHLMAN

Business Finance and Banking. By Neil H. Jacoby and Raymond J. Saulnier. New York: National Bureau of Economic Research, 1947. Pp. xviii, 24.1 $3.50.

This work is the summary volume of the business financing project carried

on by the National Bureau of Economic Research over the past several years, as one phase of its financial research program. Eight basic studies, four of them by this same team of authors, have already been published. The present work draws heavily upon the factual background of these monographs as well as upon several other unpublished studies carried out under the program.

In the words of the authors "the primary purpose of this study has been to trace and explain the development since 1900 of the relationships that exist between commercial banks and business enterprises." The traditional function of the commercial banks as suppliers of short-term (60–90 days) loans to business has been radically altered by their becoming investors in longer term credit instruments. This trend reflects a declining ratio of current to total business assets and, in turn, has been reflected in a sharp decline in the share of bank earnings from business loans.

One of the factors affecting this change in bank lending has been the decline in relative importance of agriculture and manufacturing in our economy. These two fields require heavier use of bank loans than the more dynamic service and public utility segments of our economy. Another factor has been the increased size of the business unit, since the larger units are less dependent upon bank credit, due to larger cash balances and a lower ratio of labor to fixed capital costs. While meeting the challenge of these basic structural changes, the banks have also had to contend with increasing competition from insurance companies, finance companies, and government loan agencies in filling business credit needs.

Do these changes mean that the business financing function of commercial banks will decline even more in the postwar world? The authors do not think so, provided the banks themselves continue their prewar adaptation of lending policies and practices to fit the changing needs of business. In making these adaptations certain features of American commercial banking operate as limiting factors, however. These include the low ratio of capital to total liabilities, the inherent instability of the banks' deposit liabilities, the possibility of withdrawal of government support in the bond market, undermining the "risk-less" bank holdings of these securities, various legal and administrative restrictions on high risk or long-term loans.

Business Finance and Banking is a fitting capstone to this phase of the bureau's financial research program. It is a thorough and well-presented study, with copious tables (19) and charts (33), plus an excellent summary conveniently placed at the beginning of the book.

University of Florida   C. H. Donovan

Market and Marketing Analysis. By Myron S. Heidingsfield and Albert B. Blankenship. New York: Henry Holt & Co., 1947. PP. x, 335. $3.00.

This is a welcome and overdue addition to the literature in a field which, in view of its importance and the large amount of attention it receives in trade papers and professional meetings, has singularly few textbooks. Written for beginners, by the authors' assertion, the relatively small volume attains a surprising comprehensiveness through a simplified approach, compact writing, and the avoidance of irrelevant illustration and unnecessary documentation.

While treating adequately enough the general scope and procedures of commercial research, major attention is given to survey techniques. Particularly good chapters in this section cover questionnaire development, cross-section planning, and the collection, tabulation, and interpretation of data. The value and uses of a company's own records (frequently neglected) is given special attention in another chapter and an apparently unrelated full chapter on radio problems is more than justified by its excellent critique of radio-measurement services.

The authors have resisted the common temptation to omit or lightly dismiss the treatment of statistical techniques. Sixty some pages are used to explain, in simple nontechnical language, current statistical methodology and machine tabulation. The reader or student will not learn here "how-to-do-it" but should acquire, painlessly, an understanding of the basic statistical concepts and their opportunities and limitations in application to the solution of marketing problems.

The book's seeming brevity of treatment and rather unorthodox arrangement of material may unfavorably impress the teacher at first glance and, in an effort to keep the text short and to the point, too little space has been given to sources of data. Those references noted are rather casual and sketchy, with notable omission of many fertile sources of market information, such as the Social Security Administration, university bureaus of business research, and the various active state planning and development boards.

The sprinkling of thought-provoking case histories, the chapter summaries, and suggested review questions will have appeal to the teacher and to the lay reader who wants to make full use of the book. The volume is closed by a glossary of terms commonly used in the commercial research field. Although admittedly simple rather than exhaustive and excluding statistical terms, the half dozen pages devoted to the glossary are likely to have more than proportionate value in clarifying a terminology which, to most nonprofessionals, may appear to be double talk.

University of North Carolina   C. S. Logsdon

Money and Banking. By Weldon Welfling. New York: Crofts & Co., 1947. Pp. 631. $4.50.

Prof. Welfling has designed this text for an introductory course in money and banking. The 35 chapters are quite evenly balanced between the money and the banking fields. No attempt has been made by the author to divide the material into sections and the general arrangement of the chapters would make such a division extremely difficult. Prof. Welfling appears to have considerable misgivings about the organization of the subject matter. In the preface it is pointed out that the order of the chapters is not rigid and that different sequences are entirely feasible. The author states that he has first dealt with the facts, in order to lay a better groundwork for theoretical considerations. In spite of this declared intention, some of the important tool facts are first introduced in what might be considered the last section of the book. A description of the monetary system and developments since 1930 are postponed until after the

discussion of commercial banking, the Federal Reserve System, and foreign exchange. Monetary theory and index numbers are the subject of chapter XXXI. As a result of the failure to introduce many of the tool facts and concepts until later chapters, the author has been forced into a hypothetical description. This is especially true of the section on commercial banking and the treatment of monetary standards.

Although the reviewer did not attempt an exhaustive check of the accuracy of information presented, certain inaccuracies were in evidence. For example, on page 202 we find, "each bank was to buy stock of its reserve bank equivalent to 6% of its own capital." Many important regulations are dealt with in generalities or omitted. The latter is in evidence in the discussion of member bank borrowing and advances secured to the satisfaction of the Federal Reserve System.

The book is more elementary than most of the prewar and postwar books in the field.

Alabama Polytechnic Institute   C. C. STALNAKER

STATE REPORTS

ALABAMA

Business and industrial activity during the summer of 1947 has generally maintained a high level of activity. In the steel industry production has been maintained at a very high per cent of capacity. Blast furnace activity has fallen off to some extent, but this has been due largely to the discontinuance of the operations of the government-owned furnace in Gadsden, which was operated for the government by the Republic Steel Corporation under special arrangement. During the summer employment and operations of the cotton textile mills have tended to decline to some extent; in fact, during the month of August the seasonally adjusted index of cotton consumption by textile mills in Alabama dropped to the lowest point since January of 1941. Operations of the coal mines were, of course, interrupted by the mining holiday, but, since resumption of activities, production has been maintained at a high level. In the lumber industry the slackening in demand and the decline in prices in the spring and early summer brought about a temporary interruption. Recent months, however, have seen lumber prices and movement of lumber on the upgrade once again. While there have been fluctuations, the indexes of industrial activity have reflected a demand for manufactured products that in any ordinary period would be considered very satisfactory.

Building construction has also been at a high level. One of the notable features in recent months has been an increase in the relative importance of the construction of apartment houses. Difficulty in obtaining raw materials continues to be a factor in getting building projects completed.

In the field of finance one of the notable developments has been the way in which savings in the form of saving accounts at the banks and postal savings of the cities of Alabama have failed to show signs of liquidation. The tendency has been for the percentages of increase to become smaller and in some cases to turn into small decreases but generally the level of savings of this character seems to remain high. The general feeling is that collections are becoming somewhat more difficult and that cash sales are accounting for a decreasing percentage of the total volume of business. The demand for installment credit has been showing a corresponding increase. In the case of retail trade, dollar volume generally is large. For the most part increases are recorded as compared with the same time last year; however, there are some spots of weakness. Theatre admissions and restaurant sales have been consistently off during the summer months. In all lines the percentages of increase in volume of sales do not seem to be as great as the percentages of increase indicated by price index numbers, suggesting that the physical volume of commodities moving is not as great as it was last year.

Employment in Alabama has had some ups and downs and minor adjustments but generally speaking has been quite satisfactory. Mention has already been made of the interruptions in coal mining and the lay-offs in the textile industry. These however have not deteriorated into wide spread unemployment, and it

continues difficult to secure large numbers of workers. To a very large extent any lay-offs seem to be seasonal in character, to represent minor adjustments or to arise from labor troubles of one kind or another. While there was some build-up in the claims for unemployment compensation during the earlier part of the summer, the month of August saw claims decline very considerably and the fall season seems to be characterized by relatively good employment conditions.

The Alabama State Employment Service reports that it made more than 100,000 job placements during the first eight months of 1947. During this period the employment service led the entire southeastern region in the number of placements and ranked sixth, seventh, or eighth in the nation. Two years after V-J Day the department reports that more than 97,000 jobs have been obtained for veterans and that the number of veterans seeking jobs has dropped 38 per cent since August of last year. More than 100,000 veterans applied for work with the Alabama State Employment Service between January 1 and December 31 of 1946, and about 55,000 job placements were made. This year to date some 33,000 veterans have filed applications and 34,000 placements have been made.

One of the interesting evidences of the high level of activity which has been maintained in the state is given by the recent report of the U. S. Department of Commerce on income payments by states. According to this report Alabama and Oregon tied third place in having the largest percentage of gain in per capita income from 1940 to 1946; only South Dakota with an increase of 178 per cent and Tennessee with a gain of 176 per cent were greater than the 172 per cent increase of Alabama and Oregon. Still another evidence of the high level of activity and income has been the large amount of public revenues collected by the state and the nation. During the first 11 months of the fiscal year the taxes collected by the State Department of Revenue exceeded the total collections for the previous fiscal year by more than $5,000,000. Collections from October 1, 1946, to September 1, 1947, totaled $69,500,000 as compared with $64,410,000 for the fiscal year of 1945–1946. It is quite evident that a very large increase in total collections will be made during the entire fiscal year. This increase in tax collections characterized the whole range of sources of revenue. For instance, during the first 11 months collections of gasoline taxes totaled $22,880,000 as compared with collections during the same 11 months of last year of $19,646,000 and receipts for the full year of 1946–47 were $21,759,000. During the fiscal year ending June 30, Alabama corporations paid taxes to the United States of $39,685,000. The tax paid for this fiscal year was 77.8 per cent more than was paid in the previous fiscal year. Total income tax collections from individuals and corporations for the fiscal year just ended amounted to $207,444,548.

This has been a legislative year in Alabama and a number of developments in the field of public revenues are of considerable interest. Perhaps the outstanding development was the passage of the income tax amendment. This represents the settlement of a very troublesome problem which has been mentioned several times in previous states notes. This has to do with the disposition of

the surplus funds which have been accumulating from the income tax. As has been previously noted, the original act provided that surpluses above the amounts needed for the retirement of certain refunding bonds should be used for the reduction of ad valorem taxes. However, a surplus has accumulated even after providing for recovering the amounts lost under the provision of the homestead exemption law. There has been a very great difference of opinion as to whether such a surplus should be diverted to other purposes or used to make further reductions in ad valorem taxes. The vote on the amendment approved the policy of diverting the surpluses to educational uses principally for the purpose of increasing salaries of teachers.

Another development of considerable interest was the passage of an act which abolished the use of sales tax tokens and established a bracket system for the collection of sales taxes to be effective October 1. Also the legislature abolished certain exemptions particularly on tobacco products and alcholic beverages which existed under the former sales tax law. It is estimated that these changes will yield increased revenues of approximately $400,000,000. Another hotly contested proposal was that of providing for the exemption of gasoline used for agricultural purposes from the gasoline taxes. This was popularly known as the Tractor-Gas Bill. The proponents of the proposal seemed at many times to have an unquestioned majority in at least one of the houses of the legislature. The administration, however, was very active in its oposition largely because it held that the enactment would make necessary a number of basic changes in the procedure of collecting the tax and would probably open up very serious loopholes for additional escapes. The final result was that the legislature adjourned without passing the bill.

Interest in the development of new plants and other evidence of industrialization has continued strong. The Alabama Power Company has stated that from August 1, 1945, to June 30, 1947, 126 new business enterprises have been located in their service area. These new business concerns will operate in about 65 different communities and will manufacture some 50 different products and will employ nearly 12,000 persons. Employment will range from 35 to 2,500 persons per plant. The company has announced that some of the most important plants are the large B. F. Goodrich plant producing automobile tires and tubes; the Atlas-Chamblers Manufacturing Company producing several varieties of metal products, including agricultural implements; the Hazel Atlas Glass Company, which will soon be producing glass containers at Montgomery, Alabama; the Tennessee Copper Company which will turn out large quantities of sulphuric acid for the fertilizer program; two large garment plants, which will be in production; and the Coosa River Newsprint Company.

Additional details concerning the size and operation of the newsprint plant at Childersburg have been announced. Tentative plans for the mill show that it will have a capacity of some 100,000 tons annually and will be rated to produce 350 tons of newsprint daily plus 200 tons of bleached sulphate. Plans for the construction of this mill at Childersburg have been underway for some time and the plant will use Alabama wood pulp as a raw material. The company

recently purchased 615 acres of the reservation of the Alabama Ordnance Works and in addition has leases on other facilities of the reservation. It is said that this new plant will enable every weekly newspaper in Alabama to be printed on Alabama-made paper. Approximately 1,000 persons will be employed when the plant gets under operation.

The Alabama Power Company has announced a 1947–1948 construction program of its own of $32,502,790. The company plans to spend $14,702,790 this year and $17,800,000 during 1948. The biggest single item on the new plans will be a new steam generating plant at Gadsden. The company plans to spend something over $6,000,000 in facilities necessitated by new business in 1947–1948. It estimates that some 31,000 new customers will be added during the year.

The announcement of the Republic Steel Corporation of the construction of a steel pipe mill adjacent to its plate mill in Gadsden marks the beginning of a new type of steel product. This plant will produce electrically welded steel pipe in diameters from 20 to 30 inches and in lengths of 30 feet. A great deal of interest attaches to this project because it has long been felt that pipe is a very appropriate type of product for this area.

University of Alabama   H. H. CHAPMAN

FLORIDA

The southern part of the state suffered severe property damage from storms and floods during September and October. Two hurricanes coupled with almost daily rains over the period of a month followed a prolonged period of abnormal rainfall during the spring and early summer. Although the storms were not as spectacular, or as costly in lives and property damage, as others in previous years, the floods have been perhaps the most costly in Florida's history to farmers and city dwellers alike.

At this writing (October 20) no complete estimates are available but crop losses will probably approximate 30 to 40 million dollars. Citrus growers suffered the loss of five to seven million boxes of fruit, principally grapefruit, in the September hurricane but were mainly outside the flooded areas. Some groves along the lower East Coast were under water, however. The fertile farming area of the Everglades, heart of the winter vegetable industry, was inundated over hundreds of acres. Early fall plantings of snap beans, tomatoes, eggplant, celery, peppers, cucumbers, and potatoes were washed out. Farmers' efforts to recoup their losses by replanting in time to meet the late winter market will depend for success upon clear weather and rapid draining of flooded lands. At best crops will be short and late, while some areas will probably be under water for months. Damage to ramie and sugar crops in this same area will run to several hundred thousands of dollars with half of these crops destroyed.

Cattlemen in the Okeechobee-Kissimmee Valley area were also hard hit by the flood waters overflowing their grazing lands. Several hundred head of beef cattle were drowned but the losses from starvation will be even greater. The game bird supply was likewise hard hit, especially quail and turkey.

City dwellers as well as farmers suffered heavily as the flood waters spread out

toward the ocean. Residents in inland towns around Lake Okeechobee were protected by the dike around the lake, although the water level rose above the surrounding land. Fort Lauderdale, Hollywood, Miami Springs, Hialeah, and Opa Locka were flooded over large areas for days. Smaller towns like Davie, Cloud Lake, Pompano, and others suffered proportionately heavier losses. At least 15,000 people were driven from their homes, and property damage to urban real estate will probably total $20,000,000. Damage to city streets, county and state roads will also run into millions of dollars.

These disastrous floods have not only resulted in numerous temporary measures to meet the emergency, but also have stimulated interest in a long-range water control program. In addition to the work of the Red Cross and other private relief agencies, a drive to secure a $15,000,000 disaster relief appropriation from the federal government has been started. The Army Engineers have released $300,000 in emergency funds to aid the stricken area. Equipment was rushed to the area by the Federal Works Agency, the Army, and the Navy to throw up dikes to contain the water. The Army and Navy made available several hundred acres on their ranges and fields for grazing purposes. The current disaster has also served to bring some united support from cattlemen, farmers, and urban residents for a long-range program of flood control along the lines already mapped out. Federal funds to implement this program will be asked for at the next session of Congress. State action along these lines, strongly urged by Governor Caldwell over the past two years, may now be forthcoming. This has been blocked hitherto by conflicting economic interests in the area, reminiscent of quarrels over water rights and "farmer vs. cowman feuds" in the western states. It remains to be seen whether these differences will be permanently dissolved in the current flood waters.

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After escaping major damage from storms and floods, the citrus industry looked forward to a successful year. The Bureau of Agricultural Economics estimated the crop as of October 2 to be 84,800,000 boxes, or 17 per cent smaller than on the same date in 1946. Actually only 83,100,000 boxes of last year's bumper crop were harvested because of adverse climatic and economic conditions later in the season.

By mid-October Florida grapefruit, with a temporary monopoly in northern and midwestern markets, was moving in heavy volume. Shipments of nearly 400,000 boxes per week, in contrast to a midseason norm of 200,000 to 300,000, had brought down the average auction price to $3.65 per box, compared to an early season high of $9.90. As the Texas crop moved into the markets in late October, both volume and price would recede from these high figures. However, it was not expected that prices would collapse to the low averages of last year, which were less than half those of either of the two previous years, 1944–1946. As the first shipments of oranges in volume began in October, prices were likewise expected to hold well above last year's average because smaller stocks of canned juice were on hand and the crop itself was much smaller. In spite of

substantially tighter grading standards ordered by the U. S. Department of Agriculture, there was some evidence that early fruit being shipped was immature and poor tasting. Canneries were preparing to process an even larger part of this year's crop than they did that of last year.

Meanwhile efforts to secure more unified action within the citrus industry continued on an irregular course. The proposal to set up separate grade and size regulations for Indian River fruit went before the growers for a referendum vote. While leaders of the two powerful associations of growers and shippers proclaimed themselves in favor of more unified action in principle, they continued to disagree on specific tactics for bringing about integrated action.

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Both private and public construction activity continued at record levels during the late summer and early fall. State and local public works construction during the first half of 1946 was 154 per cent above the similar period in 1945, compared to a national increase of only 43 per cent. Necessity of replacing stormwrecked highways and streets, as well as plans under way to start construction on a $22,500,000 expansion of hospital and public health facilities with federal assistance will keep public building at high levels. Private construction as measured by building permits in the areas was also breaking all previous records.

Manufacturing employment not only reflected the seasonal upturn but also was running well ahead of 1946. A study by the Florida State Chamber of Commerce indicates that this is part of a secular trend. Although Florida is not an important manufacturing state, the ratio of its payrolls to those in the whole nation was higher in 1946 than in 1940 in every one of some 12 locally significant industrial groups, except lumber and timber products. Per capita income in Florida continues higher than that for any other state in the South.

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With the opening of the fall term, Florida colleges and universities are serving a record-breaking number of students. Enrollment in public and private institutions of higher learning will approximate 30,000 students. Graduate programs in the social sciences have been greatly expanded at both state universities and the University of Miami. The University of Florida is now offering a program leading to either an M.B.A. or Ph.D. degree in economics. Several graduate assistantships are available.

Dr. J. Hillis Miller, formerly associate commissioner of education in New York state, has taken over his duties as president of the University of Florida.

University of Florida   C. H. DONOVAN

GEORGIA

Following a recent meeting of the Agricultural and Industrial Development Board of Georgia it was announced that in the future policy of the board, emphasis would be placed primarily upon developing the tourist trade and industry

in Georgia. Committees are to be designated to grade hotels, tourist homes, and service stations; to mark and preserve historical sites; to improve highways; and to develop the state's water resources.

A new 1947 edition of *Manufacturers of Georgia* has been compiled and published by the Industrial and Agricultural Development Board. This publication supersedes the edition of 1945 and lists all industries in the state as of May 1947 (1) according to type of industry and (2) according to county in which the industries are located. Because of the heavy demand for the directory in the past, its increased size and the increased cost of paper and printing, it has become necessary to levy a charge of $1.00 per copy for the 1947 edition.

During the first nine months of 1947, 457 new industries have been established in Georgia or have announced plans to begin operations in the state, according to the Agricultural and Industrial Development Board. This maintains the rate of approximately 50 new concerns per month set during 1946 when a total of 600 new firms located in this state. It brings to a total of about 1,400 the new industries established in Georgia since September 1944, when the Agricultural and Industrial Development Board was created. Many of these new industries are located in small communities and are locally owned and operated.

The largest number of new industries was recorded in the field of wood products, 93 new plants being established through September. Food processing plants were second with 69 new plants, while 54 new firms were established to produce or process stone, clay, and glass products. Other categories in which a large number of new plants have been started or planned include metal working, 49; textiles, 40; and chemicals, 30. According to the board's publication, *Industrial Newsletter*, "the fact that among the new industries wood products manufacturing is leading, with food processing second and stone, clay and glass plants third, gives ample proof that the new industries now being established in Georgia are taking advantage of the natural resources and raw materials that are found in abundance in the State."

To meet the increased demands of industry in Georgia for skilled and semi-skilled labor in larger quantities, the Georgia School of Technology is establishing what is said to be this region's first Vocational Technical Institute. The new school is intended to bridge the gap between raw industrial recruits and the factory's professional men. According to Professor R. S. Howell, who will head the new institute, it is designed to fill the need for technicians who stand about midway between a high school diploma and a college degree; that is, above the trade, but below the profession. The curriculums will include applied aeronautics maintenance, building construction, electrical technology, industrial technology, industrial safety, technical radio, and electronics and textile mechanics.

A comprehensive display of industrial products manufactured and produced in Georgia was held in Atlanta from October 8 to October 12, 1947. Many of the major industries of the state took part in the exposition, which was the first exhibit of this kind to feature solely the industrial products made in Georgia. An impressive array of products was displayed, including candy, electric fans,

brooms, men's pajamas, hosiery, motion picture equipment, plows, chairs, garbage-can holders, beds, metal furniture, metal arts, paints, paper products, surgical instruments, textiles, and cargo canoes.

The income of the state of Georgia for the first quarter of the fiscal year ending June 30, 1948, amounted to $18,373,186.99, while the budget allotments for the same period were $27,596,322.61, according to figures released by the state department of audits. In the opinion of State Auditor B. E. Thrasher, Jr., the budgets of the state departments cannot be maintained on this quarterly basis, as this would run the annual budget of the state to $110,385,290.44, which is $11,721,783.66 in excess of the actual revenue of $98,663,506.78 for the last fiscal year. While state treasury receipts for the first three months of the current fiscal year exceeded by $1,995,000 those for the same period last year, this does not, in the opinion of the state auditor, "indicate anywhere near an $11,750,000 increase in state revenues for the four quarterly periods, and the state is confronted with a hazardous situation as to what the state income tax will produce in March 1948, since there is a strong indication that there has been a drop in the taxable earnings of the people of the state." The auditor has accordingly warned all state administrative heads of the prospect for the next three quarters of adjustments downward from the budget for the quarter ended September 30, since, under the law, the state of Georgia is required to operate within its income and on a cash basis. Mr. Thrasher indicated a strong possibility that the following items of the expanded program considered by the General Assembly will not be forthcoming 100 per cent because of lack of revenue: the rural road program, the rural hospital program, funds for the building program in full of the University System, aid to county schools for buildings and equipment, the inauguration of a program to bring school bus drivers under a state salary schedule, and additional assistance for old age pensioners of the state.

Emory University   ALBERT GRIFFIN

LOUISIANA

Hugh increases in the production of carbon black in Louisiana have been noted during the year 1947. The various Louisiana plants produced almost 100,000,000 pounds of carbon black in the first six months of the year, most of it by new processes which give several times the yield from natural gas realized a few years ago, according to records from the conservation department.

Conservation department records revealed that four new "furnace" type and two channel type plants in the state produced in the first part of the year 97,977,870 pounds of carbon black from 14,217,135 thousand feet of natual gas, or an average yield of 6.89 pounds per thousand feet of gas. Some of the newer plants showed operating yields approaching 10 pounds of carbon black per thousand feet of gas. Manufacturers of carbon black are now paying prices for gas comparable to those paid by pipe line companies in Louisiana.

One of the interesting features of operation in the carbon black industry is the fact that much of the gas is first used to lift oil in wells, and then is processed

to yield gasoline, butane and other hydrocarbons. At least one carbon black manufacturer has revealed plans to process burnt gases from his plant into pure carbon dioxide, for conversion into "dry ice."

Carbon black is a finely divided pigment, and is used mostly by tire manufacturers and printing ink makers throughout the United States. In tires, manufacturers have stated that carbon black increases mileage from a few thousand miles to present usage of 50,000 or more miles, and permits operation of vehicles at higher speeds than would otherwise be possible. Most of the other uses for carbon black are for its pigment value, in the making of black paints, inks, hard rubber, and other products. It is particularly valuable in printing inks since its peculiar qualities permit operation of the great high-speed presses for modern newspapers.

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High costs of living were highlighted by the Louisiana state director of the department of public welfare in October, when newspapers of the state headlined the assertion that "a total of 91,559 Louisiana residents are slowly starving to death." This startling statement was made in the face of mounting prices which outstripped a constantly increasing outlay by the state for assistance to the needy. When a later clarification of the issue was made by the state director, it was noted that in the current fiscal year a total of $22,000,000 is being spent, as compared with $20,287,285 last year, and only $9,530,391 in the fiscal year 1939–40.

Other southern states apparently are faced with the same or greater problems in the matter of public welfare assistance. It was stated that Louisiana is still providing more adequately for its needy than most other southern states—an average old age assistance grant of $21.02 per month, compared with $17.42 in Mississippi, $18.21 in Arkansas, $17.32 in Alabama, $20.69 in Tennessee, and $17.37 in Kentucky. Louisiana's figure of $21.02 in 1947 compared with only $12.03 per month for old age assistance in 1939. The entire group of states faced with such problems of welfare are concerned with rising costs of living in the face of increasing totals of relief recipients. A suggested program for Louisiana, according to the state director, would inaugurate a flexible system of appropriating funds for welfare purposes so that the needy would be cared for despite unexpected price changes and other unforeseeable factors.

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Louisiana's new tax exemption program has been credited with having attracted new industries and expansions worth $130,000,000 since its inauguration in December 1946. The State Department of Commerce and Industry has released the information that the new industries have employed at least 12,000 persons. The program of tax exemption was put into effect in the state after the adoption of a constitutional amendment in November 1946. Additional exemptions will be granted by the state board of commerce and industry in accordance with the provisions of the amendment. Industries which have taken

advantage of the tax exemption program cover a wide range of activities, such as the lumber, petroleum, paper, and aluminum industries.

Louisiana Polytechnic Institute   PAUL T. HENDERSHOT

MISSISSIPPI

General business activity in Mississippi dropped in July and August from a high registered in June after a steady climb from a slight recession suffered in the late months of 1946. Most indicators showed some evidence of slowing down when compared with previous months. Sales tax collections showed a small reduction which may be attributed to a seasonal decline since the highest collections from this source during the past several years have occurred in the early months of the year. Bank debits also declined as did life insurance sales, postal receipts, and money orders issued. Telephones in service continued an upward climb and employment placements also showed an upward trend. Electric power consumption continues an upward trend after a seasonal decline for the first part of the year. Petroleum production continues to increase, showing a run-off of nearly 3 million barrels during July. Cash farm income for the year cannot be determined as yet but midyear reports are higher than for the same period last year. Yields from the cotton crop are not yet available but unfavorable weather during both the planting season and the growing season has reduced the crop considerably.

The strike of the Amalgamated Association of Street Railway and Motor Coach Employees of America (A. F. of L.) is five months old and seems no nearer solution than when it started. The strike, which affects operations in a number of states, started on May 20, after failure of negotiations for a new contract between the union and the bus compant. The union asked for a raise of pay from 5.25 cents per mile to 6 cents. The offering of the company was 5.40 cents with elimination of nonoperating pay of 60 cents per day and $2.00 a night room rent while away from the home terminal. The union contended that the company's proposal amounted to a reduction in wages. Recent offers of mediation by the United States Conciliation Service have been accepted by the union but refused by the company on the grounds that the strikers have been replaced and the union no longer represents the workers. Violence has marked the partial renewal of service over the struck lines and in Mississippi the Governor has ordered the National Guard to select men for guard duty on the buses. At the date of this report (October 15) no guardsmen have been ordered to ride the buses. The union has stated that its members have been cautioned against violence.

The Mississippi Public Service Commission states on October 7 that no action was taken on a petition of railroads operating in the state for a general increase of 15 per cent in all tariffs. The case, which is being contested by the Farm Bureau Federation and certain shippers, has been continued.

Asserting that rate increases for telephone service granted last May are insufficient to provide needed revenue, the Southern Bell Telephone Company has filed a petition with the Mississippi Public Service Commission proposing

rate increases to provide additional revenue of $1,500,000 annually. The company reports that higher operating costs necessitate the increased revenue.

University of Mississippi   CLARENCE E. KUHLMAN

NORTH CAROLINA

As the fall moves along toward winter there seem to be no economic conditions that are peculiar to North Carolina as distinguished from the nation as a whole. Both manufacturing industry and agriculture continue to enjoy a high rate of activity and the exhiliration of sustained prices. There are some evidences in the attitudes of the people of a certain fearful looking for judgment, but this fear is usually put resolutely out of mind.

Debts both personal and municipal seem to go on increasing, although perhaps not at an alarming rate. Certain large tobacco manufacturing companies are floating sizable loans in order to carry inventories of high-priced raw materials. The textile manufacturing industry seems to have recovered its balance following the decline in activity a few months ago. Building is a bit more active despite continued high costs. Tobacco and cotton farmers are harvesting a satisfactory crop, although prices are not up to the levels of a while ago.

The price structure displays more and more of the familiar distortions of inflation. In lines where supply of materials is still scarce and in the case of specialized services quite fantastic quotations are not infrequently encountered. In small-scale transactions especially, one discerns a disposition to test the market to the utmost. All such dispositions indicate the breathless suspense of activity at high tempo. The plans for continued economic aid to Europe are expected to prolong this delicious state; but for how long nobody knows or dares to think.

Davidson College   C. K. BROWN

SOUTH CAROLINA

South Carolina farmers are not enjoying as profitable a year as they did in 1946 but are earning more money than in prewar years. According to the estimates of the Bureau of Agricultural Economics, cash receipts from the sale of farm commodities the first eight months of 1947 totaled 147.5 million dollars as compared with 159.2 million dollars during the corresponding period a year earlier. Cash returns during the last four months of this year will probably be less than during the last four months of 1946 because returns from tobacco and cotton will be lower. The production of tobacco is smaller and most of the crop has been sold at prices much lower than in 1946. The indicated production of cotton also is smaller and prices prevailing during September and October were several cents per pound lower than last year. The total volume of all crops produced in 1947 is expected to be 5 per cent below last year's record out-turn, but 13 per cent above the 10-year average (1936–45) and the third largest in history.

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Employment conditions in South Carolina continue to improve. The number of people covered by the South Carolina Employment Security Commission was

5 per cent larger the second quarter of 1947 than the second quarter of 1946. Earnings also were up. Total earnings of employees covered by the commission were up 25 per cent. On the other hand, the number of initial claims for benefit payments has been declining and in September was the smallest since December of last year. According to the South Carolina Employment Service 492,000 people were employed in nonagricultural pursuits at the end of September. The total number of unemployed was estimated at 35,600, a decrease of 3,400 from a month earlier.

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The cost of living continues to rise. The South Carolina Department of Labor obtains retail prices of 66 food items each quarter in 10 towns in the state. Prices paid by consumers for these food items averaged 20 per cent higher in July 1947 than in July 1946 and 40 per cent higher than in July 1945. They averaged 111 per cent higher than in January 1941. The consumer, then, could purchase only 47 per cent as much food with a dollar in July 1947 as in January 1941. In other words, in terms of food, the consumer's dollar is now worth less than one-half as much as it was at the time the United States entered the war. Preliminary data indicate that the cost of food has increased since July.

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The price of South Carolina farm real estate declined four points during the summer, but is still 2⅓ times the prewar average (1935–39). If one, then, should buy a farm at current prices and pay one-half in cash and give a mortgage for the remainder he would still owe more than what the property would have sold for before the war.

Farm Credit Administration,   GLENN R. SMITH
Columbia, S. C.

VIRGINIA

Virginia has reached a crucial period in her financial history. Several months ago pressure upon state finances began to mount rapidly to provide additional funds for certain state functions, especially education. The extraordinary session of the legislature in January 1947 made additional appropriations amounting to $8 million. Since then the spotlight on state finances has been growing stronger because of these additional appropriations, and because of growing requests for funds to finance state services during the next two years.

The economic picture of Virginia will be greatly influenced by the total collections and spendings during the next biennium. Several factors enter into the picture. First, there is increasing pressure to increase and to broaden state services. This will call for considerable increase in appropriations. Second, larger capital outlays will have to be made for modernization of many state institutions, which had to be delayed because of the war. And third, the state will be feeling for the first time in its budget-making the effects of the postwar price inflation. Both service costs and material costs have advanced sharply during the past 12 months. For these reasons, fiscal planning for the next bi-

ennium is important. During the period Virginia could assume fixed financial obligations which could seriously affect her financial policies for years to come. This article will present a brief review of Virginia's fiscal position as shown (1) in the report of the comptroller for June 30, 1947, and (2) in the requests for budget appropriations for the 1948–50 biennium.

The Statement of Revenues of Accounts and Control shows total revenues for the fiscal period 1947 of $252 million, an increase of $52 million over 1946. Of this amount $89 million came from taxes. While the state levies 34 taxes, the major part of the tax revenues came from six sources. The following table is a summary of these receipts:

SOURCE	1947	1946	INCREASE
	In millions		
Motor Vehicle Fuel Tax	$32	$22	$10
Payroll Tax	10	8	2
Income Taxes:			
Personal	10	9	1
Corporation	10	7	3
Steam Railroads	5	5	.3
Beer Excise	5	5	.4

Eighty-six million dollars was received from the sale of property and commodities, $85 million of which came from the sale of alcoholic liquors, an increase of $12 million over 1946. Some of the other sources of income included $8 million from business and professional licenses and $9 million from motor vehicle licenses, an increase of more than a million dollars from these two sources. It is interesting to note that there was a sharp increase in the revenues from educational institutions reflecting the increase in numbers, and also the increase in fees in some cases.

Expenditures for the fiscal year 1947 totaled $244 million of which $236 million was for maintenance expenditures and $8 million for capital outlays. The state spent $64 million more in 1947 than in 1946. Four departments spent $56 million of this. The following table gives a summary of these expenditures:

DEPARTMENT	1947	1946	INCREASE
	In millions		
Education	$47	$36	$11
Highways	51	28	23
Alcoholic Beverage Control	71	59	12
Unemployment Compensation Commission	26	16	10

The remaining $8 million was distributed among the other 18 government agencies, all showing an increase except one. It should be pointed out that there was a 30 per cent increase in education expenditures, and 90 per cent increase in highway costs.

The state ended the fiscal year with a gross surplus of $85 million which was was more than a million dollars less than the surplus at the end of 1946. This surplus was distributed $13 million to the General Fund, $10 million to Special Revenue Funds, and $62 million to Investments for General Fund and Special Funds. In the last are held funds for the retirement of the public debt, various retirement funds, distributable funds to counties, cities, and towns, and such items. Even if the remaining free surplus could be used for general expenditures, it would cover only a small proportion of state expenditures. But the payment of recurring expenditures out of surplus is not sound financing. Therefore, since all of the state agencies depend upon funds collected from the people, and since their expenditures are pretty apt to increase in the next few years, more funds will have to be made available to them.

Budget procedure for the next biennium has been in progress in the state for the past several months. The state budget director has been receiving requests for funds from the various state agencies. According to his latest report the requests now exceed $560 million, far in excess of the $340 million for the same purposes in 1944–1946. Requests from the General Fund alone amount to $186 million, as compared with an actual allocation of $106 million for the current biennium. Requests from the Department of Education total $90 million, $88 million to come from the General Fund. The State Highway Department is requesting $112 million, and the Alcoholic Beverage Control Board $139 million. The predictions are that the revenues for 1948–1950 will be approximately the same amount as in 1946–1948. It is the responsibility of the Budget Committee to pare down these requests to fit the budget pattern. But there will have to be some increases allowed. The Governor has indicated his intention to follow the mandate of the state constitution and maintain a balanced budget. In view of this, if Virginia increases outlays for services and capital outlays which constitute a recurring demand upon the treasury, the state legislature must provide sources of additional revenues to finance the increases.

This means that Virginia has come to a crucial period in her economic life. Her legislators must seek more revenue, which probably will mean added tax burdens upon the people. The budget must be planned not only in the light of increased costs of government, but also against the possibility of a decline in business activity. It means that business has to be prepared to assume additional tax burdens whether the taxes fall directly upon individuals or business. It means that industrial activity must continue high in order to enable people to meet the additional costs of government. Our whole economy must be so planned and coordinated as to provide this high level of activity within the state so that all social areas may prosper. And finally, it means that added taxes may become very burdensome if there is a business recession throughout the nation. These matters merit careful consideration by the legislature and by all who have the responsibility of planning Virginia's financial policies.

University of Richmond   HERMAN P. THOMAS

PERSONNEL NOTES

Charles A. Acton has joined the staff of the Bureau of Business Research of the University of Kentucky.

Ernest W. Aldredge has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

Clark L. Allen has been appointed associate professor in the Department of Economics and Business Administration, Duke University.

Carl A. Anderson has been appointed instructor in accounting at the University of Florida.

Charles Arny has been appointed associate professor of agricultural economics at Southwestern Louisiana Institute.

Arthur G. Ashbrook has been appointed assistant professor in the Department of Economics and Business Administration, Duke University.

Karl E. Ashburn is now associate professor of economics at the Agricultural and Mechanical College of Texas.

L. D. Ashby has been appointed assistant professor of economics at the University of North Carolina.

Wilson T. Ashby has been appointed instructor in office administration at the University of Mississippi.

George H. Aull of Clemson Agricultural College was elected first vice president in charge of program of the Southern Economic Association at its seventeenth annual conference, which was held in Atlanta, Georgia, on November 7–8.

Virginia Austin has been appointed instructor in economics at the Woman's College of the University of North Carolina.

Samuel H. Baker, Jr., has been appointed instructor in accounting in the University of Richmond.

James M. Barr III has been appointed instructor in accounting at the University of Virginia.

Robert J. Barr has been appointed head of the Department of Economics at the University of Chattanooga.

Richard S. Berberich has been appointed instructor in economics at North Carolina State College of the University of North Carolina.

John S. Bickley has been appointed assistant professor of finance in the School of Commerce and Business Administration, University of Alabama.

Truman C. Bigham of the University of Florida was elected editor of *The Southern Economic Journal* by the Southern Economic Association at its seventeenth annual conference, which was held in Atlanta, Georgia, on November 7–8.

Gladys Boone, professor of economics at Sweet Briar College, returned to her teaching duties in September after a half-year of sabbatical leave spent in Europe.

Mrs. Julia H. Boyd has been appointed instructor in accounting, College of Business Administration, University of Tennessee.

Helen G. Brandon has been added to the faculty of Atlantic Christian College in North Carolina to teach courses in economics and geography.

J. W. Brandon has been appointed instructor in accounting in the School of Commerce and Business Administration, University of Alabama.

Edward Y. Breese has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

William N. Breswick has been appointed instructor in the Department of Economics and Business Administration, Duke University.

Hoyle E. Brewer has been appointed assistant professor of economics at Louisiana Polytechnic Institute.

Maurice R. Brewster has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

Russell E. Brown has been added to the faculty of Lenoir Rhyne College in North Carolina to teach courses in economics and social studies.

Richard W. Bryan, formerly of Catawba College, has been appointed professor of economics at Louisiana Polytechnic Institute.

R. E. Carlson has been appointed associate professor in the Department of Business Administration, Virginia Polytechnic Institute.

W. Castle joined the accounting staff of the School of Commerce and Business Administration, University of Mississippi, as instructor.

David S. Chambers is now assistant professor of statistics in the College of Business Administration, University of Tennessee.

T. B. Chisholm has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

Charles O. Chowning has been appointed instructor in business administration at Louisiana State University.

Lincoln H. Clark is now professor of marketing in the College of Business Administration, University of Tennessee.

P. E. Coldwell has been appointed associate professor of economics at Southwestern Louisiana Institute.

Harold R. Cole has been appointed instructor in accounting in the School of Commerce and Business Administration, University of Alabama.

Edward C. Collins has been appointed assistant professor of economics at North Carolina State College of the University of North Carolina.

Edward G. Cornelius, formerly of Bucknell University, has been appointed professor of business administration at Louisiana Polytechnic Institute.

Warren S. Craun has been appointed assistant professor of economics at Florida State University.

R. W. Crutchfield has accepted an appointment as associate professor of accounting at the University of North Carolina.

Arthur L. Cunkle has joined the Economics and Applied Economics staff of the University of Richmond.

Thomas F. Debnam has returned to his teaching duties as assistant professor at The Citadel.

Albert H. Dehner, formerly of Oregon State College, has been appointed associate professor of finance in the College of Business Administration, University of Tennessee.

W. P. Dillingham has been appointed assistant professor of economics at the University of Georgia.

Rev. Andrew T. Doris has been appointed to teach courses in economics and business at Belmont Abbey College in North Carolina.

Edgar S. Dunn, Jr., has been appointed instructor in economics and statistics at the University of Florida.

Clayton Ellis resigned at Mississippi State College to become associate professor of economics at Roanoke College.

Norbert L. Enrich has been appointed associate professor of business administration at Southwestern Louisiana Institute.

Leo M. Favrot, Jr., has been appointed associate professor of accounting at Tulane University.

E. Elwood Ford has been appointed associate professor of applied economics in the University of Richmond.

C. M. Forrest has become instructor in business administration at The Citadel.

L. C. Fowler has been appointed acting assistant professor of economics at the University of Mississippi.

W. R. Frazier has been appointed instructor in the Department of Business Administration, Virginia Polytechnic Institute.

George W. Freeman, formerly on the staff of Webber College, has become assistant professor of business administration at Rollins College.

Milton Goldberg has been appointed instructor in business administration at Louisiana State University.

Kenneth Grubbs has accepted an appointment as instructor in economics at the Agricultural and Mechanical College of Texas.

Webber B. Haines has joined the staff of Rollins College as assistant professor of economics.

Odis Lee Harris is now instructor in journalism in the College of Business Administration, University of Tennessee.

Hugh Hawk has been appointed assistant professor of economics at Washington and Lee University.

Mary Ann Hearon has been appointed instructor in secretarial studies at the University of Georgia.

George Heather, formerly on the staff of the University of Denver, has been appointed head of the newly created Department of Commerce, Florida State University.

Harold J. Heck has been appointed professor of foreign trade at Tulane University.

Victor Heck has been named assistant professor in the Department of Economics and Business Administration at Vanderbilt University.

M. R. Henderson has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

William Carroll Henry has been appointed associate professor of accounting in the College of Business Administration, University of Tennessee.

Leo Herbert has been appointed professor of accounting and head of the Department of Commerce at Louisiana Polytechnic Institute.

Glenn Hodge, formerly at Louisiana State University, has been appointed associate professor of business administration at Louisiana Polytechnic Institute.

B. B. Holder has been promoted to associate professor of commerce at Washington and Lee University.

Robert E. Holladay has been appointed assistant professor of accounting at Louisiana Polytechnic Institute.

Calvin Hoover has resigned as dean of the Graduate School of Duke University in order to give more time to research.

Allison N. Horton has been added to the staff of the Department of Business Administration, Tennessee Polytechnic Institute.

Edna M. Howard has returned to Florida State University as instructor in commerce, after graduate study at the University of Tennessee.

Lillian E. Howell has been appointed instructor in secretarial studies in the School of Commerce and Business Administration, University of Alabama.

William J. Hudson, formerly of the University of Texas, is now associate professor of transportation, College of Business Administration, University of Tennessee.

Harold Hughes has been appointed professor of economics at Tulane University.

Ethel H. Kelly has been appointed assistant professor of secretarial science at Louisiana Polytechnic Institute.

Wiley Kilpatrick has been appointed visiting professor in the Department of Economics and Business Administration, Duke University.

Harold J. King, former labor economist with the Toledo Chamber of Commerce, has been appointed professor of economics at Louisiana State University.

Clarence E. Kuhlman, University of Mississippi, has been appointed Mississippi correspondent for *The Southern Economic Journal*.

Bess Lance, formerly on the staff at Whitmer College, is now instructor of social studies and economics at Florida State University.

Joe Lane, Jr., has been added to the staff of the Department of Business Administration, Tennessee Polytechnic Institute.

Ben T. Lanham, Jr., has resigned as associate agricultural economist at the Alabama Polytechnic Institute.

David Lapkin of Columbia University has been appointed instructor in the Department of Economics at the College of William and Mary.

Laurence C. Larkin, Jr., has been appointed instructor in economics at North Carolina State College, University of North Carolina.

Charles W. Lewis, formerly of the University of Rochester, has accepted a position as associate professor of marketing at Alabama Polytechnic Institute.

C. S. Logsdon has been appointed professor of marketing at the University of North Carolina.

Howard O. Long has been appointed associate professor of economics at Carson-Newman College.

William F. E. Long II has been appointed instructor in economics at North Carolina State College, University of North Carolina.

Robert Lorenz has been appointed associate professor of economics at the University of Georgia.

Arthur Mace, Jr., has been appointed assistant professor in the Department of Economics and Business Administration, Duke University.

L. D. MacMillan, formerly auditor of the University of North Carolina, has been appointed visiting assistant professor of accounting at Duke University.

Lewis D. Malphrus has recently resigned his position with the Farm Home Administration to become assistant agricultural economist at Clemson College.

L. R. Masters has become instructor in business administration at The Citadel.

Louis D. Mayfield has been appointed associate professor of business administration at Southeastern Louisiana College.

Lee D. McChesney has been appointed assistant professor of economics at Alabama Polytechnic Institute.

John B. McFerrin of the University of Florida was elected secretary-treasurer of the Southern Economic Association at its seventeenth annual conference, which was held at Atlanta, Georgia, November 7–8.

Dan M. McGill is now assistant professor of finance in the College of Business Administration, University of Tennessee.

Francis E. McVay has been appointed assistant professor in economics at North Carolina State College, University of North Carolina.

J. Melbourne, formerly of Colgate University, has been appointed professor of economics at Louisiana Polytechnic Institute.

Raymond F. Mikesell has been promoted to the rank of professor of economics at the University of Virginia. He is also serving as consultant to the Department of State on a part-time basis.

Charles Milbut has been appointed assistant professor of geography at the University of Florida.

James F. Miles, formerly of the Extension Service of the U. S. Department of Agriculture, has accepted a position at Clemson College and will do research in the field of agricultural marketing.

Minnie C. Miles has returned to full-time teaching in the Department of Management, after a leave of absence to serve as personnel director of a large firm, in the School of Commerce and Business Administration, University of Alabama.

W. H. Milner, formerly at Clemson College, has become assistant professor of business administration at The Citadel.

John M. Mitchell has been appointed visiting assistant professor of economics at Tulane University.

Aurelius Morgner has been appointed associate professor of economics at the Agricultural and Mechanical College of Texas.

James A. Morris has joined the staff of the University of South Carolina as adjunct professor of economics.

D. F. Mulvihall, assistant professor of marketing in the School of Commerce

and Business Administration, University of Alabama, was absent on leave during the last fall quarter to do graduate work at the University of Chicago.

James C. Nelson, formerly chief, Transportation Division, U. S. Department of Commerce, is now professor of economics at Washington State College.

William E. Newbolt of Berea College has joined the staff of the Bureau of Business Research, University of Kentucky.

Fred W. Noe has been made head of the Department of Business Administration at Carson-Newman College.

Walter O'Donnell has been appointed associate professor of economics at Florida State University to replace Royal Mattice, who is on leave to continue graduate work at the University of North Carolina.

John O'Neal has been appointed associate professor of finance at the University of North Carolina.

T. G. O'Neal has been appointed assistant professor of applied economics in the University of Richmond.

George T. O'Neill has been appointed associate professor of economics at North Carolina State College, University of North Carolina.

James M. Owen has been appointed assistant professor of business administration at Louisiana College.

Harry M. Palmer has become a member of the staff of the Bureau of Business Research, University of Kentucky.

Paul W. Panstian has been appointed professor of economics in the School of Commerce and Business Administration, University of Alabama.

James M. Parrish has been appointed instructor in economics in the School of Commerce and Business Administration, University of Alabama.

Charles A. Partin has been appointed assistant professor of economics and business administration at Southwestern at Memphis.

Norman Pauling has been appointed instructor in the Department of Economics and Business Administration at Vanderbilt University.

Clarence Philbrook has been appointed associate professor of economics at the University of North Carolina.

Aubrey M. Phillips has been appointed instructor in accounting at Northeast Junior College of Louisiana State University.

Valentin Pikner has been appointed instructor in economics at North Carolina State College, University of North Carolina.

Gerald A. Porter has been appointed assistant professor in the Department of Office Administration, School of Commerce and Business Administration, University of Mississippi.

Anna E. Rader has been added to the staff of the Department of Business Administration, Tennessee Polytechnic Institute.

George Rader has been appointed assistant professor of secretarial science at Southwestern Louisiana Institute.

Einar Rasmussen has been appointed assistant professor of accounting at the University of Georgia.

B. U. Ratchford is on leave from the Department of Economics and Business

Administration at Duke University for this year to work on a research project for the Committee for the South.

Charles E. Ratliff, Jr., has been appointed instructor in economics and accounting at Davidson College.

George O. Riggs has been appointed instructor in economics at the University of Georgia.

Walter M. Rogers has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

John C. Rumble has been appointed assistant professor of economics at Tulane University.

Ralph Russell, associate professor of accounting in the School of Commerce and Business Administration, University of Alabama, returned to active duty after a year's leave of absence.

Elmer Schick has joined the staff of Florida State University as assistant professor in commerce.

G. T. Schwenning of the University of North Carolina was elected president of the Southern Economic Association at its seventeenth annual conference, which was held in Atlanta, Georgia, on November 7–8.

Rose Scotola has been appointed instructor of accounting at Southwestern Louisiana Institute.

Francis S. Scott has returned to the University of Mississippi after a year's leave at the University of Texas.

Raymond D. Sharp has been added to the faculty of the Industrial Management, Social Science, and Economics Department, Georgia School of Technology.

Gardner Sharpe has been appointed assistant professor of economics at Rollins College.

W. G. Shover, formerly on the staff of Mississippi State College for Women, has been appointed professor of economics and acting head of the Department of Economics, Florida State University.

A. Louis Shugerman has been appointed visiting professor in the Department of Economics and Business Administration, Duke University.

Edward C. Simmons, formerly assistant professor at the University of Michigan, has been appointed associate professor in the Department of Economics and Business Administration, Duke University.

F. McP. Sinclair and Richard W. Setzer have been appointed to teach the courses in economics and business at Catawba College.

Clarence A. Slocum has been appointed professor and head of the Industrial Management Department in the College of Business Administration, University of Tennessee.

Mary V. Slusher, formerly at Virginia Polytechnic Institute, has accepted a position as assistant professor at the University of Akron.

Anna Greene Smith is head of the Department of Sociology at Meredith College, which offers courses in economics and labor problems.

Clarence D. Smith has been appointed associate professor of business statistics in the School of Commerce and Business Administration, University of Alabama.

D. M. Smith, Jr., has been appointed instructor in accounting at Louisiana State University.

F. DeVere Smith has been appointed associate professor of economics in charge of secretarial science at the University of South Carolina.

T. M. Stanback, Jr., has been appointed associate professor of business administration at the University of North Carolina.

R. P. Stovall has been appointed assistant professor of economics at the University of North Carolina.

Victor V. Sweeney has joined the staff of the University of Florida as assistant professor of economics.

L. Paul Terrell, formerly at the University of Florida, has accepted a position as associate professor of economics at Alabama Polytechnic Institute.

Carey C. Thompson has accepted an assistant professorship of economics at the University of Texas.

Oliver G. Thompson has been appointed an instructor in economics at North Carolina State College, University of North Carolina.

Horace Townsend, Jr., is now associate professor of transportation in the College of Business Administration, University of Tennessee.

Robert W. Travis has been appointed instructor in economics in the College of Business Administration, University of Tennessee.

Orba F. Traylor, formerly at the University of Denver, is now on the staff of the College of Commerce, University of Kentucky.

Wallace D. Trevillian of the University of Virginia has been appointed instructor in economics at Clemson Collge.

Willis C. Tucker has been appointed professor of journalism in the College of Business Administration, University of Tennessee.

E. K. Turner, formerly with the University of Kentucky Bureau of Business Research, is now connected with the Kentucky State Department of Revenue.

W. C. Tuthill has been appointed instructor in accounting in the School of Commerce and Business Administration, University of Alabama.

Andre L. Van Assenderp has been appointed assistant professor of economics at Tulane University.

Paul Vespa has been appointed assistant professor of economics at the University of Chattanooga.

Vern H. Vincent is now associate professor of accounting in the College of Business Administration, University of Tennessee.

George A. Wagoner is now associate professor of business education in the College of Business Administration, University of Tennessee.

James E. Ward, Jr., formerly head of the Department of Economics and Political Science at Clemson College, has accepted an appointment as head of the Department of Economics at George Peabody College for Teachers.

Gerald E. Warren has been appointed assistant professor of economics at Tulane University.

W. G. Watkins has been appointed instructor in the Department of Business Administration, Virginia Polytechnic Institute.

DeWitt C. Watson, former assistant professor of economics at Loyola University at Los Angeles, has been appointed associate professor of business administration at Louisiana State University.

J. R. Werth has been appointed instructor in the Department of Business Administration, Virginia Polytechnic Institute.

Leland C. Whetten has been appointed assistant professor of accounting at the University of Georgia.

W. T. Whitman of The Citadel has resigned to accept an associate professorship at Emory University.

Asa Whitt has been appointed instructor in accounting in the University of Richmond.

Samuel Wilcox has been appointed assistant professor of economics at the University of Georgia.

Ned Williams has been appointed instructor in economics at the University of Mississippi.

Theodore F. P. Wischkaemper has been appointed assistant professor of economics at Alabama Polytechnic Institute.

Neel H. Wood, formerly at the University of Virginia, has joined the research staff of the University of Arkansas Agricultural Experiment Station.

David McCord Wright of the University of Virginia was elected second vice president in charge of membership of the Southern Economic Association at its seventeenth annual conference, which was held in Atlanta, Georgia, on November 7–8.

J. R. Young, formerly of the University of Chattanooga, has been appointed lecturer in insurance and real estate in Louisiana State University.

The following names have been added to the membership of the Southern Economic Association:

Robert C. Austin, The Austin Co., Box 267, Greeneville, Tenn.

C. C. Dawson, Mississippi Southern College, Station A, Hattiesburg, Miss.

Rector R. Hardin, Box 147, Howard College, Birmingham 6, Ala.

Anne E. Hulse, Box 137, Hampton Bays, N. Y.

Lee M. James, Southern Forest Experiment Station, Mid-City Station, Box 7295, New Orleans 19, La.

Howard O. Long, Carson-Newman College, Jefferson City, Tenn.

J. V. McElveen, Box 1169, Clemson, S. C.

John C. Persons, First National Bank of Birmingham, Birmingham, Ala.

Richard Powers, Box 42, Clemson, S. C.

John C. Redman, Department of Agricultural Economics, Mississippi State College, State College, Miss.

W. D. Trevillian, Box 1258, Clemson, S. C.

NOTE

Program of the Seventeenth Annual Conference, held at the Henry Grady
Hotel, Atlanta, Georgia, November 7–8, 1947

FRIDAY, NOVEMBER 7, 1947

Registration, Henry Grady Hotel

9:00 A.M.—MEETING OF THE EXECUTIVE COMMITTEE

10:00 A.M.—MORNING SESSION

Chairman: Richard H. Lyle, Social Security Administration, Atlanta

Topic: *Social Security in the South*

1. The Development of Unemployment Compensation in the South

W. R. Curtis, Administrative Standards Division, Bureau of Employment
Security, Washington, D. C.

2. Old-Age Assistance and Old-Age and Survivors' Insurance

E. J. Eberling, Vanderbilt University

Discussion

S. M. Derrick, University of South Carolina
Paul N. Guthrie, University of North Carolina
Albert S. Keister, The Woman's College, University of North Carolina
Burton R. Morley, University of Alabama
Oreen M. Ruedi, Hollins College
George T. Starnes, University of Virginia

2:00 P.M.—AFTERNOON SESSION

Chairman: Harlan L. McCracken, Louisiana State University

Topic: *The South and International Trade*

1. The South's Stake in International Trade; Past, Present, and Prospective

B. U. Ratchford, Duke University

2. Internal Economic Policies of the South in Relation to International Trade

Henry M. Oliver, Jr., Northwestern University

Discussion

Earle L. Rauber, Federal Reserve Bank of Atlanta
John V. Van Sickle, Wabash College
Rutledge Vining, University of Virginia
Sigismond deR. Diettrich, University of Florida
Raymond F. Mikesell, University of Virginia
Charles G. Siefkin, Emory University

6:00 P.M.—DINNER MEETING

of the Board of Editors of *The Southern Economic Journal* together with
State Reporters and Officers of the Association

8:00 P.M.—EVENING SESSION

Chairman: Ralph C. Hon, Southwestern at Memphis

Presidential Address: *The Problem of Order in Economic Affairs*

Joseph J. Spengler, Duke University

SATURDAY, NOVEMBER 8, 1947

9:00 A.M.—BUSINESS MEETING

10:00 A.M.—MORNING SESSION

Chairman: R. P. Brooks, University of Georgia

Topic: *The Effect of World War II on State Tax Structure*

1. The Effect of World War II on State Revenues

James W. Martin, University of Kentucky

2. War and Postwar Developments in State Expenditures

Hershal L. Macon, Tennessee Valley Authority

Discussion

Paul E. Alyea, University of Alabama
George H. Aull, Clemson Agricultural College
Charles F. Marsh, College of William and Mary
David M. McKinney, University of Mississippi
W. O. Suiter, North Carolina Tax Research Department
Thurston Walls, Mississippi State College

BOOKS RECEIVED

The Economics of Minimum Wage Legislation. Washington: Chamber of Commerce of the United States, 1947. Pp. 42. Paper, 50¢.

Meeting the Special Problems of Small Business. New York: Research and Policy Committee, Committee for Economic Development, 1947. Pp. 61. Paper, 25¢.

Industry-Wide Collective Bargaining and the Public Interest. By John V. Van Sickle. New York: American Enterprise Association, 1947. Pp. 20. Paper, 50¢.

The Economics of Full Employment. By F. A. Burchardt and others. New York: Macmillan Co., 1947. Pp. vii, 213. $2.75.

Economic History of the American People. By Ernest L. Bogart and Donald L. Kemmerer. 2nd ed. New York: Longmans, Green & Co., 1947. Pp. viii, 856. $4.50.

Public Utility Regulation. By Herman H. Trachsel. Chicago: Richard D. Irwin, 1947. Pp. x, 538. $5.00.

Personnel Management. By Michael J. Jucius. Chicago: Richard D. Irwin, 1947. Pp. xii, 696. $5.00.

Prosperity Decade: From War to Depression: 1917–1929. By George Soule. New York: Rinehart & Co., 1947. Pp. xiv, 365. $4.00.

Understanding Society: The Principles of Dynamic Sociology. By Howard W. Odum. New York: Macmillan Co., 1947. Pp. vi, 749. $5.00.

Or Forfeit Freedom. By Robert Wood Johnson. New York: Doubleday & Co., 1947. Pp. xi, 271. $2.50.

Field Administration of Wartime Rationing. By Emmette S. Redford. Washington: U. S. Government Printing Office, 1947. Pp. xi, 196. Paper, 40¢.

Mathematics of Business and Accounting. By Kenneth Lewis Treffets and E. Justin Hills. New York: Harper & Bros., 1947. Pp. xii, 267 and appendix. $3.00.

Principles of Industrial Organization. By Dexter S. Kimball and Dexter S. Kimball, Jr. 6th ed. New York: McGraw-Hill Book Co., 1947. Pp. xix, 531. $4.50.

Income and Employment. By Theodore Morgan. New York: Prentice-Hall, 1947. Pp. xv, 280. $3.25.

Unemployment Protection for Seamen: A Record of Planning and Legislation. Albany: State of New York Department of Labor, Division of Placement and Unemployment Insurance, November 1946. Pp. 100. Paper, 25¢.

World Minority Problems. By James G. Leyburn. New York: Public Affairs Committee, 1947. Pp. 32. Paper, 20¢.

The Law of Business. By William H. Schrampfer. New York: Rinehart & Co., 1947. Pp. xviii, 679. $4.50.

Principles of Economics. By Albert E. Waugh. New York: McGraw-Hill Book Co., 1947. Pp. xii, 934. $4.50.

Market and Marketing Analysis. By Myron S. Heidingsfield and Albert B. Blankenship. New York: Henry Holt & Co., 1947. Pp. x, 335. $3.00.

Research on Wages: Report of a Conference Held on April 4–5, 1947 at the Yale Labor and Management Center. By Lloyd G. Reynolds. New York: Social Science Research Council, 1937. Pp. vi, 41. Paper, 50¢.

The Board of Directors and Business Management. By Melvin T. Copeland and Andrew R. Towl. Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1947. Pp. xii, 202. $3.25.

A Program for Sustaining Employment. 2nd ed. Washington: Chamber of Commerce of the United States of America, 1947. Pp. 32. Paper, 10¢.

The Foreign Loan Policy of the United States. By J. B. Condliffe. New York: American Enterprise Association, 1947. Pp. 32. Paper, 50¢.

War and Prices in Spain, 1651–1800. By Earl J. Hamilton. Cambridge: Harvard University Press, 1947. Pp. xxvi, 295. $5.00.

Studies in Industrial Price Control. By Robert J. Benes and others. Washington: U. S. Government Printing Office, 1947. Pp. viii, 181. Paper, 35¢.

Principles of Economics. By Frederic B. Garver and Alvin Harvey Hansen. 3rd ed. Boston: Ginn and Co., 1947. Pp. ix, 463. $4.75.

Export-Import Banking. By William S. Shaterian. New York: Ronald Press Co., 1947. Pp. ix, 397. $5.00.

Money, Credit and Banking. By Ray B. Westerfield. Rev. ed. New York: Ronald Press Co., 1947. Pp. ix, 1096. $5.00.

Elements of Farm Management. By John A. Hopkins. 3rd ed. New York: Prentice-Hall, 1947. Pp. xvi, 524. $5.35.

Southern Manufacturer's Tax Bill. By James W. Martin and others. Lexington: University of Kentucky, 1947. Pp. viii, 88.

Air Passenger Traffic. By William L. Grossman. Brooklyn, N. Y.: Remsen Press Division, Chemical Publishing Co., 1947. Pp. x, 205. $3.00.

Applied Economics. By Raymond T. Bye and William W. Hewett. 4th ed. New York: Crofts & Co., 1947. Pp. viii, 718. $4.00.

Volunteers in OPA. By Imogene H. Putnam. Washington: U. S. Government Printing Office, 1947. Pp. ix, 166. Paper, 35¢.

Forward Prices for Agriculture. By D. Gale Johnson. Chicago: University of Chicago Press, 1947. Pp. xiii, 259. $3.00.

Staatswirtschaftslehre des Kameralismus. By Anton Tauscher. Berne: Francke, 1947. Pp. 127. Paper, s.fr. 14.50.

Theorie und Praxis der moderne Einkommensbesteurung. By Frederich Neumark. Berne: Francke, 1947. Pp. 456. S.fr. 35.

Der Wandel des internationalen Kartellbegriffs: Amerikanische Kartelldoktrin und World Trade Charter. By Friederich Haussmann. Berne: Francke, 1947. Pp. viii, 160. Paper, s.fr. 11.50.

Discrimination by Railroads and Other Public Utilities. By Isaac Beverly Lake. Raleigh, N. C.: Edwards & Braughton Co., 1947. Pp. xii, 346. $5.00.

SOUTHERN ECONOMIC ASSOCIATION

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Membership dues in the Association are: annual $3.00, sustaining $5.00, contributing $10.00, life $60.00, institutional $10.00. Membership fees include payment for a year's subscription to *The Southern Economic Journal*.

Applications for membership should be addressed to J. B. McFerrin, University of Florida, Gainesville, Florida.